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Accountant for Bayfield Brownstone Co. and R. D. Pike, Wholesale Lumber, Bayfield, Wis., 1886-91; Instructor in Arithmetic and Bookkeeping in High School, St. Paul, Minn., 1891-96.

JESSIE LOUISE JONES, Instructor in German.
A. B., Doane College, 1884; Graduate Student University of Michigan, 1894-95; Student in Berlin and Paris, 1888-90; Teacher in Jacksonville Female Academy, 1890-93; Teacher of German, Chicago Preparatory School, 1893-94; Teacher of German, Chicago Female College, 1894-95; Fellow, University of Chicago, 1895-96; Ph. D., *ibid.*, 1897.

CHARLES EMERSON PEET, Instructor in Physiography.
B. S., University of Wisconsin, 1892; Fellow in Geology, University of Chicago, 1892-95; Assistant New Jersey Geological Survey, 1891-95; Assistant U. S. Geological Survey, 1895-97; Instructor in Geology and Physical Geography, Englewood High School, 1897-99.

HELEN DOUGAL STREET, Instructor in Latin.
A. B., University of Wisconsin, 1876; A. M., *ibid.*, 1879; Instructor in High School, Madison, Wis., 1877-81; Instructor in Latin, University of Wisconsin, 1883-84.

PHILEMON BULKLEY KOHLSAAT, Instructor in English.
Ph. B., University of Chicago, 1894; Teacher in Chicago Heights High School, 1894-95; Instructor in Latin, Chicago Academy, 1895-96; Fellow in English, University of Chicago, 1897-99.

GEORGE ALEXANDER ROSS, Instructor in Woodwork.
Instructor in Woodwork, Chicago Manual Training School, 1890-93; Instructor in Woodwork, Jewish Training School, Chicago, 1893-98.

STEPHEN EMERY, Instructor in Mathematics.
A. B., Boston University, 1890; Instructor in Medford, Mass., High School, 1890-92; Principal of Academy, Yankton, South Dakota, 1892; Instructor in Mathematics, Harvard School, Chicago, 1893-94.

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Physical Director, Montclair Military Academy, 1891-97; Special Instructor, Harvard University Summer School of Physical Training, 1897; Student, Medical College of Virginia, 1897-98.

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Graduate of the Art Institute, Chicago.

JOHN LORD BACON, Instructor in Forge Work.
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ARCHIBALD WHITTIER SMALLEY, Instructor in Latin.
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Grad[illegible]te, Chicago.

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[illegible]ALLEY, Instructor in Latin.

[illegible]an, 1898; Instructor in Adrian (Mich.) High School,

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LEWIS INSTITUTE

FOUNDED BY ALLEN C. LEWIS

DEVOTED TO

SCIENCE, LITERATURE, AND
TECHNOLOGY

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CORPORATION.

OFFICERS.

JOHN A. ROCHE,
President.

CHRISTIAN C. KOHLSAAT,
Vice-President.

JOHN McLAREN,
Secretary and Treasurer.

TRUSTEES.

OLIVER H. HORTON,
THOMAS KANE,
CHRISTIAN C. KOHLSAAT,
JOHN McLAREN,
JOHN A. ROCHE.

BOARD OF MANAGERS.

GEORGE N. CARMAN,
WILLIAM R. HARPER,
OLIVER H. HORTON,
THOMAS KANE,
CHRISTIAN C. KOHLSAAT,
ALBERT G. LANE,
HENRY M. LYMAN,
JOHN McLAREN,
JOHN A. ROCHE.

BUSINESS AGENT, WILLIAM H. HALL.

Calendar 1902-1903.

July 7, Monday—Summer Session begins.

Aug. 15, Friday—Summer Session ends.

Sept. 8-12, Monday to Friday—Final Examinations for Admission.

Sept. 15, Monday—Autumn Quarter begins for students who have not heretofore been in attendance at the Institute. Recitations for one week as a basis for permanent classification.

Sept. 22, Monday—Autumn Quarter begins for students who were in regular attendance during the year 1901-1902.

Sept. 29-Oct. 3, Monday to Friday, Evenings—Registration and Classification of candidates for admission to Evening Classes.

Oct. 6, Monday—Evening Classes begin.

Nov. 27-28, Thursday and Friday—Thanksgiving Recess.

Dec. 19, Friday—Autumn Quarter ends.

Holiday Recess for two weeks.

Jan. 5, Monday—Winter Quarter begins.

Feb. 12, Thursday—Lincoln's Birthday—Patriotic Exercises.

March 20, Friday—Winter Quarter ends.

Quarterly Recess for one week.

March 30, Monday—Spring Quarter begins.

From May 16 to June 27—Preliminary Examinations for Admission. Saturdays from 9 A. M. to 1 P. M.

June 19, Friday—Spring Quarter ends.

FACULTY.

GEORGE NOBLE CARMAN, Director.

A. B., University of Michigan, 1881; Principal Ypsilanti (Mich.) High School, 1880-82; Superintendent of Schools, Union City, Mich., 1882-85; Principal Brooklyn (N. Y.,) Grammar School No. 15, 1885-89; Principal St. Paul (Minn.) High School, 1889-93; Dean of the Academy of the University of Chicago, Morgan Park, Ill., 1893-95.

WILLIAM ALBERT GREESON, Professor of Mathematics, and Dean of the Faculty.

A. B. and A. M., University of Michigan, 1879; Principal Flint (Mich.) High School, 1879-81; Instructor in Grand Rapids, (Mich.) High School, 1881-85; Principal of Grand Rapids (Mich.) High School, 1885-96.

EDWIN HERBERT LEWIS, Professor of English.

A. B., Alfred University, 1887; A. M., *ibid.*, 1887; Senior Teacher, Vice-Principal, Plainfield (N. J.) High School, 1887-88 and 1889-90; Student in Italian libraries, 1888-89; Professor of Latin, Alfred University, 1890-92; A. M. and Ph. D., Syracuse University, 1892; Fellow in English, University of Chicago, 1892-93; Assistant in Rhetoric, *ibid.*, 1892-94; Ph. D., University of Chicago, 1894; Instructor in Rhetoric, *ibid.*, 1894-96; Associate Professor, *ibid.*, 1896-99.

PAUL MELLEN CHAMBERLAIN, Professor of Mechanical Engineering, in charge of Machine Design and Engineering Laboratory.

B. S., Michigan Agricultural College, 1888; M. E., Cornell University, 1890; with Brown Hoisting and Conveying Machine Co., Cleveland, Ohio, 1889-90; Assistant Engineer with Frick Co., Waynesboro, Pa., 1890-92; Mechanical Engineer for Hercules Iron Works, 1892-93; Assistant Professor Mechanical Engineering, Michigan Agricultural College, 1893-96; Assistant Professor of Mechanical Engineering, Lewis Institute, 1896-99.

CHARLES WESLEY MANN, Professor of History.

A. B., De Pauw University, 1887; A. M., *ibid.*, 1888; Instructor in Mathematics and French, De Vaux College, N. Y., 1887-88; Instructor in Mathematics, and Superintendent, Kenyon Military Academy, Gambier, Ohio, 1888-91; Associate Principal, Illinois Military Academy, Morgan Park, 1891-92; Dean of Chicago Academy, 1893-96; Assistant Professor of History, Lewis Institute, 1896-1900.

PHILIP BELL WOODWORTH, Professor of Physics and Electrical Engineering.

B. S., Michigan Agricultural College, 1886; M. E. in Electrical Engineering, Cornell University, 1890; with Brush Electric Co., Cleveland, Ohio, 1889-90; Student in University of Berlin, 1891-92; Assistant Professor in charge of Physics and Electrical Engineering, Michigan Agricultural College, 1892-99; Assistant Professor of Physics and Electrical Engineering, Lewis Institute, 1889-91.

CLARENCE ELBERT DEPUY, Assistant Professor of Mechanical Engineering, in charge of Shop Practice and Machine Construction.

B. S. in Mechanical Engineering, University of Michigan, 1891; in Machine Shop of Dennis Machine Co., Jackson Mich., 1883-87; Instructor in Machine Shop, Chicago Manual Training School, 1891-96.

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B. S., Michigan Agricultural College, 1888; M. E., Cornell University, 1890; with Brown Hoisting and Conveying Machine Co., Cleveland, Ohio, 1889-90; Assistant Engineer with Frick Co., Waynesboro, Pa., 1890-92: Mechanical Engineer for Hercules Iron Works, 1892-93; Assistant Professor Mechanical Engineering, Michigan Agricultural College, 1893-96; Assistant Professor of Mechanical Engineering, Lewis Institute, 1896-99.

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A. B., De Pauw University, 1887; A. M., *ibid.*, 1888; Instructor in Mathematics and French, De Vaux College, N. Y., 1887-88; Instructor in Mathematics, and Superintendent, Kenyon Military Academy, Gambier, Ohio, 1888-91; Associate Principal, Illinois Military Academy, Morgan Park, 1891-92; Dean of Chicago Academy, 1893-96; Assistant Professor of History, Lewis Institute, 1896-1900.

PHILIP BELL WOODWORTH, Professor of Physics and Electrical Engineering.

B. S., Michigan Agricultural College, 1886; M. E. in Electrical Engineering, Cornell University, 1890; with Brush Electric Co., Cleveland, Ohio, 1889-90; Student in University of Berlin, 1891-92; Assistant Professor in charge of Physics and Electrical Engineering, Michigan Agricultural College, 1892-99; Assistant Professor of Physics and Electrical Engineering, Lewis Institute, 1889-91.

CLARENCE ELBERT DEPUY, Assistant Professor of Mechanical Engineering, in charge of Shop Practice and Machine Construction.

B. S. in Mechanical Engineering, University of Michigan, 1891; in Machine Shop of Dennis Machine Co., Jackson Mich., 1883-87; Instructor in Machine Shop, Chicago Manual Training School, 1891-96.

HERBERT EDGAR COBB, Assistant Professor of Mathematics.

A. B., Wesleyan University, 1887; A. M., *ibid.*, 1890; Instructor in Mathematics, Maine Wesleyan Seminary and Female College, 1887-90; Instructor in Mathematics, University of Colorado, 1890-92; Graduate Student in Mathematics and Lecturer in University Extension Division, University of Chicago, 1892-96; Instructor in Mathematics, Lewis Institute, 1896-99.

MILO GRANT DERHAM, Assistant Professor of Greek and Latin.

A. B., Cornell University, 1892; Instructor in Greek and Latin, Dayton Academy, Dayton, Ohio, 1892-93; Instructor in Latin, Academy of Northwestern University, 1893-94; Instructor in Greek and Latin, Chicago Academy, 1894-96; Instructor in Greek, Lewis Institute, 1896-99.

ALEXANDER WILLETT MOSELEY, Assistant Professor of Applied Mechanics.

S. B., Massachusetts Institute of Technology, 1891; Draftsman, World's Columbian Exposition, Chicago, 1891-93; with Webster Mfg. Co., Chicago, 1894-95; Chief Draftsman Atlanta Exposition, summer 1895; Instructor in Mechanical Engineering, Massachusetts Institute of Technology, 1895-99; with Wm. Sellers & Co., Philadelphia, 1899; Assistant Professor of Mechanical Engineering, Michigan Agricultural College, 1900.

WARREN RUFUS SMITH, Assistant Professor of Chemistry.

A. B., Bowdoin College, 1890; Ph. D., University of Chicago, 1894; Instructor in Science, Leicester Academy, Leicester, Mass., 1890-91; Scholar in Chemistry, Clark University, 1891-92; Fellow in Chemistry, University of Chicago, 1892-94; Assistant in Chemistry, Bowdoin College, 1894-95; Instructor in Science, New Bedford High School, New Bedford, Mass., 1895-96; Instructor in Chemistry, Lewis Institute, 1896-1900.

JAMES WALTER FERTIG, Assistant Professor of History.

A. B., University of Nashville, 1890; A. M., *ibid.*, 1891; Graduate Student in History Vanderbilt University, 1891-92; Instructor in History and Mathematics, Montgomery Bell Academy, Nashville, 1891-93; Graduate Student in History and Political Science, University of Chicago, 1893-97; Fellow in History, *ibid.*, 1894-97; Lecturer in the Extension Department, *ibid.*, 1895-96; Ph. D., *ibid.*, 1897; Professor of History, University of Arkansas, 1898-99; Instructor in History, Lewis Institute, 1899-1902.

JOSEPH RALEIGH NELSON, Assistant Professor of Latin.

A. B., University of Michigan, 1894; Instructor in Latin in John Marshall High School, Chicago, 1894-1900; Instructor in Latin, Lewis Institute, 1900-02.

FRED A. ROGERS, Assistant Professor of Physics and Electrical Engineering.

B. S., in Electrical Engineering, University of Michigan, 1894; Electrical Engineer for Vermillion Milling and Electric Co., Vermillion, S. D., 1895-96; Assistant in Physics, Lewis Institute, 1896-97; Instructor in Physics and Electrical Engineering, *ibid.*, 1897-1902.

LEA RACHEL DELAGNEAU, Instructor in French.

Instructor in French, Chautauqua, N. Y., 1887-92; Instructor in French, Morgan Park Academy, 1893-95; Instructor in French and History in High School, Ottawa, Ill., 1888-96.

LOUIS EDWARD POPE, Instructor in Mathematics.

Accountant for Bayfield Brownstone Co. and R. D. Pike, Wholesale Lumber, Bayfield, Wis., 1886-91; Instructor in Arithmetic and Bookkeeping in High School, St. Paul, Minn., 1891-96.

JESSIE LOUISE JONES, Instructor in German.
A. B., Doane College, 1884; Graduate Student University of Michigan, 1894-95; Student in Berlin and Paris, 1888-90; Teacher in Jacksonville Female Academy, 1890-93; Teacher of German, Chicago Preparatory School, 1893-94; Teacher of German, Chicago Female College, 1894-95; Fellow, University of Chicago, 1895-96; Ph. D., *ibid.*, 1897.

CHARLES EMERSON PEET, Instructor in Physiography.
B. S., University of Wisconsin, 1892; Fellow in Geology, University of Chicago, 1892-95; Assistant New Jersey Geological Survey, 1891-95; Assistant U. S. Geological Survey, 1895-97; Instructor in Geology and Physical Geography, Englewood High School, 1897-99.

HELEN DOUGAL STREET, Instructor in Latin.
A. B., University of Wisconsin, 1876; A. M., *ibid.*, 1879; Instructor in High School, Madison, Wis., 1877-81; Instructor in Latin, University of Wisconsin, 1883-84.

PHILEMON BULKLEY KOHLSAAT, Instructor in English.
Ph. B., University of Chicago, 1894; Teacher in Chicago Heights High School, 1894-95; Instructor in Latin, Chicago Academy, 1895-96; Fellow in English, University of Chicago, 1897-99.

GEORGE ALEXANDER ROSS, Instructor in Woodwork.
Instructor in Woodwork, Chicago Manual Training School, 1890-93; Instructor in Woodwork, Jewish Training School, Chicago, 1893-98.

STEPHEN EMERY, Instructor in Mathematics.
A. B., Boston University, 1890; Instructor in Medford, Mass., High School, 1890-92; Principal of Academy, Yankton, South Dakota, 1892; Instructor in Mathematics, Harvard School, Chicago, 1893-94.

CHARLOTTE WHIPPLE UNDERWOOD, Instructor in English.
A. B., University of Michigan, 1892; Instructor in English and German, High School, Racine, Wis., 1892-94; Instructor in Latin and German in High School, Moline, Ill., 1894-96; Graduate Student in English, University of Chicago, 1896-97.

CHARLES EDGAR HOYT, Instructor in Foundry Work.
Instructor in Foundry Work and Pattern Making, Michigan Agricultural College, 1894-98; with Walker Manufacturing Company, Cleveland, Ohio, summer of 1897.

EDWARD BURTON DEGROOT, Instructor in Physical Culture.
Physical Director, Montclair Military Academy, 1891-97; Special Instructor, Harvard University Summer School of Physical Training, 1897; Student, Medical College of Virginia, 1897-98.

MARIE ELSA BLANKE, Instructor in Freehand Drawing.
Graduate of the Art Institute, Chicago.

JOHN LORD BACON, Instructor in Forge Work.
Graduate of Chicago Manual Training School, 1896; with Illinois Steel Co., 1896; with Marine Iron Works, 1896-98.

JULIA FLORINDA DUMKE, Instructor in German.
Ph. B., University of Chicago, 1898; Student at University of Berlin, 1897-98; Assistant Principal in High School, Belle Plaine, Iowa, 1891-93.

ARCHIBALD WHITTIER SMALLEY, Instructor in Latin.
A. B., University of Michigan, 1898; Instructor in Adrian (Mich.) High School, 1898-99.

WILLIAM EUGENE MOFFATT, Instructor in Latin.
A. B., University of Chicago, 1896; Graduate Student, *ibid.*, 1896-97, 1901; Instructor in Latin, South Side Academy, Chicago, 1897; Assistant in Latin and Greek, Bradley Polytechnic Institute, 1897-1901; Assistant in Greek, University of Chicago, summer 1900.

DIC HECTOR TROWBRIGE, Instructor in Chemistry.
B. S., University of Michigan, 1898; Instructor in Adrian (Mich.) High School, 1898-99; Assistant in Chemistry, University of Michigan, summers, 1899-1900.

CHARLES SCHENCK, JR., Instructor in Mechanical Drawing.
Student at University of Illinois, 1896-98; Draftsman with Troy Laundry Machinery Co., 1898-99; with W. S. McKinney, Mechanical Engineer, 1899; with Chicago Union Traction Co., Engineering Department, 1899-1901; with Purdy & Henderson, Civil Engineers, 1901.

LAURA ESTELLE WATSON BENEDICT, Librarian and Instructor in Library Economy.
A. B., University of Chicago, 1900; Instructor in Home School, Racine, Wis., 1882-84; Cataloguer in the Newberry Library, Chicago, 1890-96; Librarian of Lewis Institute, 1896-99.

LEWIS GUSTAFSON, Instructor in English.
A. B., University of Chicago, 1900; Assistant in English, Lewis Institute, 1897-1900.

MARGARET TOWLES, Instructor in Domestic Economy.
A. B., LaGrange College, Missouri, 1880; Instructor in Elocution, Glasgow, Mo.; Instructor in Domestic Science in Chicago Public Schools, 1899-1900.

EDWARD HERMAN LAY, Instructor in Mathematics.
A. B., Yale University, 1894; Instructor in Mathematics, West Jersey Academy, 1895-96; New York Military Academy, 1896-97; Buckley High School, 1897-98; Graduate Student, University of Chicago, 1898-99; Principal Buchanan College, Troy, Mo., 1899-1900.

FRANK BERTRAM WADE, Instructor in Chemistry.
S. B., Wesleyan University, 1901; Assistant in Science, New Bedford High School, 1894-97.

KATE HEINTZ WATSON, Instructor in Domestic Economy.
Teacher in Public Schools, Princeton, Ill.; Graduate of Armour Institute of Technology in Department of Domestic Arts.

ANNA FORSTER, Instructor in French.
Graduate of Royal Seminary, Breslau, Germany, 1872; Instructor in German and French, Hillside School, Wisconsin, 1896-98.

WILLIAM PARKER HAWLEY, Instructor in Mechanical Drawing.
B. S., Michigan Agricultural College, 1892; Student, Cornell University, summer, 1899; Machinist with Troy Laundry Machinery Co., 1895-96; Draftsman with Coe Typesetting Machine Co., 1896-98; Teacher of Manual Training, Chicago Public Schools, 1898-1901; Draftsman, Ordnance Office, Washington, D. C., 1901.

JOHN DERK NIES, Instructor in Physics and Electrical Engineering.
B. S., Michigan Agricultural College, 1894; with Municipal Lighting Plant, Holland, Mich., 1894-1901; Student, Cornell University, 1900.

ROBERT HENRY TAFT, Instructor in Machine Shop.
Graduate of English High and Manual Training School, Chicago, 1894; with Miehle Printing Press Mfg. Co., 1894-1901.

IRENE STODDARD BAKER, Instructor in English.
A. B., University of Michigan, 1900; Assistant in English, Lewis Institute, 1901-02.

MARY MOULTON SMITH, Instructor in Domestic Economy.
Graduate of Gannett Institute, Boston, 1888; Associate in Science, Lewis Institute, 1902

SARA ANNA JANSON, Instructor in Biology.
S. B., University of Chicago, 1900.

JESSE MYRON OWEN, Instructor in English.
Ph. B., Iowa College, 1900; Instructor in English, French, and German in Ashland (Ky.) High School, 1900-01; Instructor in English and History in Drury College Academy, 1901-02.

FRANK VAN VLIET, Instructor in Mathematics.
A. B., University of Michigan, 1902.

Other Officers and Assistants.

EDITH M. ABBOTT, A. B., English and Latin.
ETHEL P. ANDRUS, English.
NELLIE G. BARNARD, Sewing.
WILLIAM H. BATES, A. B., Mathematics.
CHARLES F. BEEZLEY, English.
GRACE D. BISSELL, English.
T. HARRIS BOUGHTON, English.
AGNES BROWN, Cookery.
ELIZABETH BURTON, Physical Culture.
EDITH CAMERON, A. B., Spanish.
RICHARD I. CAMPBELL, M. D., Music.
HARLEY R. COLVER, Ph. B., English.
FRED E. DAUNER, Accounting.
LETCHER V. DAY, Mechanical Drawing.
FRITZ B. ERNST, B. S., Mechanical Drawing.
HENRY O. ERWIN, English.
ALBERT W. EVANS, Woodwork.
LENORE E. FANCHER, Physical Culture.
HERMAN FISCHER, Penmanship.
HORACE S. FISKE, A. M., English Literature.
FRANK H. GILCHRIST, Latin.
HERBERT W. HESS, English.
E. STUART HINTON, Architectural Sculpture.
CHARLES P. HULBIRD, Mechanician and Curator.

WILLIAM J. KEARNEY, B. S., Engineer.
ISABEL L. KILNER, English.
MAY L. LESTER, Cookery.
HENRY LLOYD, S. B., Mathematics.
EMELIE LUTZ, Cookery.
LYDIA MOJONNIER, Clerk.
ELLIS F. MUTHER, Mechanical Drawing.
EDWIN NOURSE, English.
GEORGE H. PALTRIDGE, Photography.
EVA POPE, Accountant and Stenographer.
HAROLD ROBBINS, Machine Sketching.
IDA SERVEN, Elocution.
IRVIN L. SIMMONS, B. S., Mechanical Drawing.
TINA M. SKEER, English.
JOHN H. SMALE, English.
CAROLINE GROVER SMITH, Domestic Economy.
JOHN C. SOUTH, M. S., Mathematics.
ALDA M. STEPHENS, English.
GUSTAV SUNDBERG, Forge Work.
JOHN A. TUCK, Ph. B., Mathematics.
BERTHA VAN HOOZEN, M. D., Home Nursing and Emergencies.

Organization and Equipment.

Historical Sketch.

The Lewis Institute owes its existence to the late Allen C. Lewis, who, by his will, which was admitted to record November 1, 1877, left a large part of his estate for the support of the Institute, and provided for its organization. Articles of incorporation for the Institute thus projected were granted by the Secretary of the State of Illinois, July 9, 1895.

James M. Adsit, Henry F. Lewis, and Hugh A. White were named in the will as the first trustees of the estate, the estimated value of which in 1877 was five hundred and fifty thousand dollars. Credit is due to these trustees, and especially to Hugh A. White, for such efficient management that the estate amounted, when turned over to the trustees of the Lewis Institute, November 21, 1895, to one million six hundred thousand dollars.

John A. Roche, Christian C. Kohlsaat, and John McLaren, under whom the Institute was incorporated, constituted the board of trustees from May 28, 1894, until the completion of the present buildings. The sites previously chosen having proved unsuitable, the trustees selected and purchased, at an expense of one hundred and sixty-nine thousand dollars, the principal portion of the block extending from Monroe street to Madison, between Winchester avenue and Robey street. This site is centrally located in the West Division of Chicago, and is easily accessible from all parts of the city by means of several lines of surface cars, and the Lake street and Metropolitan elevated roads.

Aim and Scope of the Work.

Taking into account the design of the founder, as expressed in his will, the experience of other institutions recently founded

with similar purposes and intentions, and the present educational needs of the city and locality, the management has determined to make the Institute "a thorough polytechnic school, and do all in their power to make it second to none in the thoroughness and efficiency of the teaching," with the understanding that such modifications and developments will be made in the future as the needs of the community suggest, and the resources of the Institute make possible.

Organization.

The Institute consists of the SCHOOL OF SCIENCE AND LITERATURE and the SCHOOL OF ENGINEERING.

The work of the School of Science and Literature is arranged in three Divisions. The Preparatory, which covers what is usually done in the first two years in the high school; the Academic, covering the work of the last two years of the high school; and the Collegiate, which corresponds to the first two years of college work.

The School of Engineering offers instruction in mechanical and electrical engineering to students who wish to become professional engineers. The work extends through four years. The courses of instruction in wood, pattern, foundry, forge, and machine shops, together with those in drawing, design, sketching, applied mathematics, electrical and mechanical engineering laboratories, are outlined under Engineering, pages 37 to 42. The aim is to present these subjects so that the student will become familiar with the underlying principles and acquire intelligence and skill in manipulation. Persons who intend to follow a trade allied to engineering may pursue such special courses as are recommended after consultation with the Director. The instruction given at night furnishes similar opportunities to those who are occupied during the day.

Tuition.

The Institute is provided with a liberal endowment, and is designed to help those who are willing to help themselves in securing such an education as will give them a more complete

mastery of modern life, with its increasing demands for skilled and intelligent service. To offer instruction free is believed to be consistent neither with the design of the Institute nor with that spirit of self-help and self-respect which is the basis of what is best in human character and achievement.

The uniform cost of instruction for full regular work is *twenty dollars a quarter of twelve weeks.* A reduction is made for a single course of instruction, and for evening courses.

Three scholarships have been established under the will of the late Mrs. Hugh A. White. Mr. John McLaren was named in the will to assign these scholarships. The assignments for the year 1901-2 were as follows:

Zella Bissell, Graduate of West Division High School.

George Cassell, Graduate of John Marshall High School.

Joseph Klima, Graduate of English High and Manual Training School.

The income derived from the endowment and tuition fees enables the Institute to secure the best talent and facilities for the accomplishment of its purpose, all receipts from tuition and other sources being used for the maintenance and advancement of the work.

The Buildings and their Appointments.

The buildings, which were ready for occupancy at the opening of the Institute in September, 1896, cover a space extending one hundred and ninety-five feet on Madison street, by one hundred and twenty-five feet on Robey, and consist of the main building, which faces on both Madison and Robey streets, and a detached building for shopwork. The main building is six stories high above the basement. The first floor on Madison street is used for business purposes, in accordance with a provision of the will of the founder. A lecture hall, with a seating capacity of seven hundred and fifty, comprises the first and second floors on Robey street. The remainder of the main building is used for libraries, laboratories, lecture rooms, and class rooms. The shop building is two stories high, with a basement, in which are the boiler, engine, and forge rooms.

The new engineering building and gymnasium connects with the south end of the main building on Robey street and covers a space one hundred and twenty-two by sixty-six feet. It is two stories high above the basement and will ultimately be extended four stories higher. The basement is used as an electrical engineering laboratory. The remainder of the building serves as a large and commodious gymnasium, with adequate bath and locker rooms. The gymnasium is well equipped with apparatus and is suited to the needs of such indoor games as basket ball, hand ball, and indoor baseball. There is also a gallery for the accommodation of spectators.

The buildings are fire-proof structures of brick, sandstone, and terra-cotta, with steel framework. They were erected at a cost of two hundred and fifty-five thousand dollars, exclusive of fittings and furnishings, and are designed to accommodate one thousand students. Both the shop and the main building are supplied with elevators and the most approved appliances for heating and ventilation, and are equipped with whatever apparatus is needed for the successful accomplishment of the work that has been undertaken.

The Library.

The library consists of about nine thousand volumes, selected with immediate reference to the needs of each department. It is essentially a working library, containing all necessary reference works, together with representative books in the various sections of history, biography, literature, fine arts, engineering, mathematics, philology, and sociology. There are special libraries connected with the class rooms in physics and chemistry. During the past year there have been added to the library about one thousand volumes, including Murray's New English dictionary, the Statutes at Large from Magna Charta to George II., 1758, Harper's Encyclopædia of United States history, Nouveau Larousse illustré, and the Engineering index, 1884-1900, by means of which the technical and scientific periodicals are now made available for reference. Four hundred and thirty-five volumes of periodicals have been bound and placed in the read-

ing-room. One hundred and sixty-nine periodicals are currently received.

Throughout the school year the library is open from eight a. m. to six p. m.; during the session of the night school, the hour for closing is ten p. m. The students at all times have free access to the shelves. Members of the library training-class serve in turn at the reference desk and assist in making the students familiar with the arrangement of the books and the use of the dictionary catalog. It has been attempted to make the catalog a clear, simple guide to the resources of the library and to keep it free from confusing technicalities. The Dewey system of classification is used, with Cutter book numbers.

The Laboratories.

The *Geographical and Geological Laboratory* equipment includes the following: Topographical atlas sheets of the United States to the number of several hundred; United States Coast and Geodetic Survey charts and Geological folios; Mississippi and Missouri river charts; pilot charts of the Atlantic and Pacific oceans; weather maps and charts; relief globe of the earth; relief maps of the United States and of selected localities; collections of common rocks and minerals; several hundred lantern slides; tables and facilities for moulding topographic features; books of reference.

The Department of Physics has especially equipped lecture-room with stereopticon and demonstration galvanometers, academic laboratory, departmental library, apparatus and preparation room, electrolytic room, collegiate laboratory, electrical measurements room, photometric room, private work-room, and photographic rooms. In the academic laboratory each table is provided with four slate-lined fuse boxes from which four different currents for use in testing may be obtained. The reference library is supplied with a large assortment of books on the subjects of Physics and Electricity, and the leading periodicals of this country and Europe. The electrolytic room is equipped with a two and one-half K. W. "Churchward" rotary transformer, transforming from 110 volts direct current to six volts

either direct or alternating current; also complete electo-plating equipment. The photometric room is equipped with a Lummer-Brodhun photometer and standard lamps.

The work-room is in charge of a competent mechanician, and is equipped with an eight-inch Rivett precision lathe, with attachments for milling, grinding, and screw-cutting, a Walker grinder, and numerous hand tools.

The laboratories are fully equipped with all apparatus for quantitive work in general physics and electricity. Some of the more recent additions to the outfit for work in light are the following: a Schmidt and Haensch spectrometer, a Schmidt and Haensch polariscope, a Michelson interferometer, and a Newton lecture-room polariscope.

The electrical equipment consists of standards of resistance, capacity, self-induction, and electromotive force; resistance boxes, bridges, galvanometers, and electrometers from Nalder Brothers & Co., Elliott Brothers, and Hartmann & Braun; also dynamometers and Weston & Whitney voltmeters, and ammeters of various types and ranges. A twelve-inch induction coil furnishes an important part of the equipment. Specially designed switch-boards are located in the lecture-room and academic laboratory. The latter is equipped with a Weston voltmeter, a Weston ammeter, and an automatic circuit breaker.

The apparatus in the engineering laboratory is also available for use in the department of physics.

The rooms assigned to the *Department of Chemistry* occupy the west end of the fifth floor. They include a lecture room, departmental library, general laboratory, analytical laboratory, organic laboratory, balance room, and store room. The lecture room has a seating capacity of 300. The laboratories are furnished with convenient desks, supplied with water and gas. In each laboratory there is a liberal number of hoods, each of which is exhausted by an electric fan. The store room is supplied with all the apparatus needed for the courses as outlined. It also contains a full list of chemicals, both organic and inorganic, including a set of specimens of the most important naturally occurring compounds of each element. The balance

room is provided with Sartorius analytical balances. The department library includes the best English, German, and French reference works, and the current English and American periodicals.

The east end of the fifth floor is used for the work in *Domestic Economy*. It contains a lunch room and a kitchen, a cooking laboratory, and recitation rooms.

The *Lunch Room* is large, airy, furnished and decorated with taste. Lunch is prepared in the Institute kitchen, under the direction of the instructor in domestic economy. The bill of fare always includes soup, milk, chocolate, sandwiches, fruit, and a warm dish, such as meat-pie or baked beans, and usually a salad and a light dessert. Students who bring their lunches from home are permitted to use the lunch room tables. They may, if they desire, supplement their lunches with articles from the bill of fare.

Next to the lunch room is the *Cooking Laboratory*. This has accommodations for sixteen students, with every facility for individual work.

Shops and Engineering Laboratory.

The shop building contains the boiler room, the engine room, the forge shop, the foundry, the wood shop, and the machine shop.

The *Engineering Laboratory* is equipped with such machines and instruments as are required for tests of materials, measurements of power, etc. The equipment includes a 200,000 lb. Olsen testing machine; transverse and impact Keep machines for cast iron; a dynamograph for cast iron; a 30 H. P. return flue boiler, arranged for natural or induced draft; a 7x12 Straight Line engine; a Wheeler surface condenser; a 23 H. P. Sprague electric motor; a 35 arc light dynamo; a 5 K. W. 2-phase alternator; a 5 K. W. rotary transformer; a 5 K. W. direct current Wenstrom generator; a 3 H. P. Northern Electric motor; a 3 H. P. Lundell motor; four fifty-light transformers with 3 to 2 or 2 to 3 phase connections. There are also various types of dynamometers—absorption and transmission—gauge

testers, injectors, arc lamps, bank boards, etc., necessary to such a laboratory.

Additions to the Engineering Laboratory made during the year include a 5 K. W. 30,000 volt testing transformer with instruments; three 2 H. P. single phase motors; one 2 H. P. three-phase motor; one 5 H. P. variable speed three-phase motor; one 10 H. P. synchronous motor; two constant current series arc transformers with lamps; 10 different types small motors, 1 H.P. and above; Riehle Bros. 40,000 lb. testing machine; Olsen torsion testing machine; Thurston oil tester; Fairbanks Morse 2,000 lb. cement testing machine; Chetalier pyrometer; air and ammonia compressor in connection with a half ton refrigerating system; experimental engine with special adjustments for valve and eccentric setting; 5 H. P. gas engine; smoke analysis equipment; Parr's coal calorimeter; Carpenter's coal calorimeter and steam calorimeter; fifty-foot gauge testing mercury column; Alden 25 H. P. water brake and dynamometer; high pressure air reservoirs, capable of withstanding 1,200 lbs. per square inch; vertical pipe economizer in connection with experimental boiler.

The power equipment is so arranged that portions of it at a time may be used for Engineering Laboratory work. The steam is generated in four sixteen-foot by sixty-inch multitubular boilers. These are connected to both power and heating systems. The engines and generators are so connected that either or both may be used on the different light and power circuits. The larger unit is a Ball engine direct connected to a 75 K. W. generator. The smaller unit is a Ball and Wood tandem compound 10x18x12, directly connected to a Siemens & Halske 60 K. W. generator.

The *Foundry* is in the basement, but is well lighted by natural and electric lights. A sand floor, benches on the wall, and a pit in the floor afford opportunity for practice in all ordinary forms of moulding. The equipment includes a 22x42 rattler, complete sets of shovels, riddles, rammers, bellows, trowels, sticks, lifters, and various sizes of snap and floor flasks, sweeps, etc. A cupola 16 inches inside lining, suspended from the ceil-

ing upon roller-bearing trunnions, affords practice in the details of cupola management and melting. An iron oven heated by gas provides for baking cores.

The *Forge Shop* is in the basement, but is so situated as to be amply supplied with light during the day, and at night is lighted by arc lamps. The equipment consists of a tempering forge, a 16x22 rattler, post drill, shear, and carborundum grinder, sixteen forges, one 250 pound, one 200 pound, and fourteen 150 pound anvils, hammers, sledges, fullers, swages, and the usual forge tools. There is also a 200-pound steam hammer for making heavier forgings than is convenient with hand hammers. Blast for the forges is supplied by a 24-inch blower, and the smoke is taken away by a 60-inch exhaust fan. The exhaust piping is overhead and the hoods are of cast iron. Both fans are driven directly by a fifteen horse-power electric motor.

The *Wood Shop*, on the first floor, is equipped with fifteen double benches, each side having a vise, a general closet, and four locked drawers. The closets in the benches contain the general tools used by the students in common, and the drawers contain sets of edge tools for the use of the individual student. Special tools and supplies are kept in the tool room. The machines in the wood shop comprise four 10-inch lathes, twelve 11-inch lathes, one 24-inch, 12-foot bed, overhanging spindle, pattern-maker's lathe, one 24-inch surface planer, one revolving combination cross-cut and rip circular-saw table, one 36-inch band saw, one universal trimmer, a grindstone, and an emery tool grinder. The saw and planer are belted directly to independent iron-clad electric motors, the other machinery being driven by a 10-horse-power electric motor.

The *Machine Shop* is on the second floor. Along one side and one end extends a bench upon which are placed 22 vises for hand work. The machine tools comprise one 12-inch engine lathe with draw chuck, three 14-inch 6-ft., two 15-inch 6-ft., one 16-inch 8-ft., and one 18-inch 12-ft. engine lathe, two 12-inch speed lathes, one 24-inch back geared drill press, one sensitive drill, one screw machine with 1⅜-inch hollow spindle and wire feed, one 16-inch crank shaper, one 24-inch x 24-inch x

6-ft. planer, one universal back-geared miller, one 30-inch universal grinding machine, one universal tool and cutter grinder, one double wet-emery tool grinder, and a power hack-saw. In the tool room are kept all the tools used on the machines, the hand tools and files used on machines and benches, and a variety of tools and instruments for making the ordinary measurements in modern shop practice. The tool room is in charge of an attendant, who issues checks for tools desired by the students. Power for driving the machines is furnished by a 10-horse-power electric motor.

The Drawing Rooms.

The sixth story of the building, containing about 10,000 square feet of floor space, is used for drawing. The rooms are lighted by thirteen large skylights, placed so as to avoid the direct rays of the sun. The equipment consists of such drawing tables, screens, lockers, blackboards, casts, etc., as are needed for the work done.

Since the lighting of the drawing rooms is from above, the wall space is available for displaying photographs and drawings under glass in fixed frames. Subjects closely related to the work of designing are thus constantly kept before the student.

A blue-print room, located on the floor above the drawing rooms, contains a curved glass blue-print machine, made in the Institute shops. This machine is universal in its adjustments for getting direct sunlight.

The School of Science and Literature.

Admission.

Each candidate for admission is required to furnish a testimonial of honorable dismissal from the school last attended. He must also refer to two persons, preferably his teachers or employers, from whom information about him may be obtained.

Candidates from Chicago grammar schools and other schools of equal rank, who have completed satisfactorily the work of the eighth grade, may be admitted without examination, upon recommendation of the principal of the school from which they come. Application for admission should be made in person, upon one of the days set for the regular entrance examination.

Candidates for admission to the Preparatory Division other than those mentioned above are examined as follows:

1. English. The candidate will be expected to write, neatly and legibly, a few paragraphs on one of several subjects assigned by the examiner. These subjects will require no special or "school" knowledge, but will draw upon the student's past experience of ordinary life. Because this is the fact, the candidate will be expected to spell correctly all the words he uses in his paper. He is advised to use no word concerning the spelling of which he is in doubt.

The candidate will further be expected to answer questions of average difficulty concerning English grammar, as treated in such a book as Kittredge and Arnold's The Mother Tongue, Part II, or Lewis's Applied English Grammar. Ability to understand the relations of the parts of a complex sentence to each other is a good indication of the degree of maturity required in the successful applicant.

2. Arithmetic. The examples set will be practical problems in common and decimal fractions, common measures, and per-

centage as it is applied in ordinary business. Mental arithmetic from dictation will be a part of the examination, and both the facility and the accuracy of the candidate will be tested.

3. History of the United States. Pupils will be expected to know something of the settlement of North America; the Revolutionary War, the War of 1812, and the Civil War; the inventions that have favored trade and manufactures; compromises and legislation concerning State Rights and Slavery. Some knowledge will be required concerning the biography of famous Americans and concerning questions of the day.

4. Geography. The examinations will be given in the form of outline maps on which natural features, lines of communication, and other geographical facts are to be located. The pupil should have an accurate knowledge (1) of the location of the more important physical features (mountains, plains, seas, rivers, etc.); (2) of the important political subdivisions (countries, states and chief cities); (3) of the important natural resources; and (4) of commercial geography. In all these respects emphasis should be placed on the geography of North America and Europe.

Candidates for advanced standing are admitted upon presentation of certificates from Chicago high schools and other schools of equal rank, and are assigned to classes upon the basis of these certificates. Any such standing is regarded as probationary until confirmed by examination. The examinations are held during the first week of each school year, and take the form of recitations, oral and written, which determine the candidate's fitness to continue the work in the classes to which he has been assigned. The Institute reserves the right to revise such standing if it should appear that the student needs more time for preparation in any given subject.

The Preparatory Division.

The Preparatory Division is designed not only as a preparation for the more advanced Divisions, but also as a means of discovering and revealing to the students their special aptitudes and limitations, that they may choose wisely the direction of

their subsequent studies. With this end in view, each student's program of work is arranged according to his individual needs, and is revised each quarter in the light of the work of the preceding quarter. The progress a student makes depends on his own ability and application, and is quite independent of what others are doing. As a result of the first two years' work, the student should have such a knowledge of himself as will enable him to make an intelligent choice of one of the groups of advanced work.

In the Preparatory Division most of the lessons are prepared under the direction of the teacher for whom the work is being done. The students meet their teacher in his class room, library, laboratory, or work shop, which is equipped with such appliances, in the way of books, apparatus, or tools, as will enable him to make his teaching most effective and to furnish his students with whatever they need for the successful preparation of their lessons. In a word, the laboratory method of teaching is applied to all subjects of study. In all Divisions classes are limited in number to twenty-five, so that each student may receive such individual instruction as he needs, and be tested each day as to the faithfulness with which he has prepared the work assigned.

In the Preparatory Division, a *credit* signifies the successful completion of a course of instruction that continues for twelve weeks, and requires from ten to twelve hours a week, counting time of preparation and recitation.

REQUIREMENTS FOR THE PREPARATORY CERTIFICATE.

To obtain the Preparatory Certificate the student must secure 21 credits, of which 7 are prescribed as follows:

English	3 credits.
Algebra and Geometry	4 "

SUGGESTIVE PREPARATORY CURRICULA.

The following curricula are designed to suggest to patrons and students various combinations of studies, and the order in which they may be taken.

The numbers following the subjects refer to the Courses of Instruction as defined on pages 31-58.

CURRICULUM A. Recommended to candidates for the Preparatory Certificate in preparation for admission to the Academic Division.

First Year.			*Second Year.*		
English, 1	page	31	English, 2	page	31
Mathematics, 1, 2, 3	"	35	Mathematics, 4, 5, 6	"	35
Latin, 1, 2, 3	"	49	Latin, 4, 5, 6	"	49
Physiography, 1, 2	"	43	German, 1, 2, 3, or	"	53
Engineering, 2, or	"	38	French, 1, 2, 3	"	54
Domestic Economy, 1	"	56			

CURRICULUM B. Recommended to candidates for the Preparatory Certificate as a final certificate.

First Year.			*Second Year.*		
English, 1	page	31	English, 2	page	31
Mathematics, 1, 2	"	35	Mathematics, 4, 5, 7, 8, 9	"	35
Latin, 1, 2, 3	"	49	Latin, 4	"	49
Physiography, 1, 2	"	43	Chemistry, A, B, C, or	"	46
Engineering, 1, 2, or	"	38	Eng'ng, 3, 4, 7 or 6, 11, 12, or	"	38
Domestic Economy, 1, 2	"	56	Dom. Economy, A, B, C	"	56

The Academic Division.

The work of the Academic Division is arranged in the *Science Group,* in which emphasis is placed upon science and the modern languages as a preparation for college work in general science and engineering; and in the *Literature Group,* in which most attention is given to the ancient and modern languages as a preparation for college work in liberal arts.

In the Academic Division a *credit* signifies the successful completion of a course of instruction that continues for twelve weeks, and requires from ten to twelve hours a week, counting time of preparation and recitation.

REQUIREMENTS FOR ACADEMIC CERTIFICATE

To obtain the Academic Certificate in the *Science Group,* the student must secure 42 credits, as follows:

English, 1, 2, 3, 5, 6	5	credits
History	3	"
Mathematics, 1, 2, 3, 4, 5, 6, 10, 11, 12	9	"
Science	8	"
Latin, or German, or French (one or two languages)	9	"
Foreign Languages, or Engineering, or Domestic Economy	6	"
Electives	2	"

To obtain the Academic Certificate in the *Literature Group,* the student must secure 42 credits, as follows:

English, 1, 2, 3, 5, 6	5	credits
History	3	"
Mathematics, 1, 2, 3, 4, 5, 10, 11	7	"
Physics and Chemistry	3	"
Latin	12	"
German, or French, or Greek (one language)	6	"
Electives	6	"

SUGGESTIVE ACADEMIC CURRICULA.

SCHEDULE C. Recommended to candidates for the Academic Certificate in the *Science Group* for admission to the Collegiate Division in preparation for the degree of Bachelor of Science.

The Courses of Instruction in Curriculum A, and the following in addition:

First Year.			*Second Year.*		
History, 3, 4, 5	page	33	English, 5, 6	page	32
Mathematics, 10, 11	"	36	History, 6, 8	"	34
Physics, 1½, 3	"	44	Mathematics, 12	"	36
German, 4, 5, 6, or	"	53	Chemistry, 1, 2, 3	"	46
French, 4, 5, 6	"	55	German, 7, 8, 9, or	"	53
			French, 7, 8, 9	"	55

CURRICULUM D. Recommended to candidates for the Academic Certificate in the *Literature Group* for admission to the Collegiate Division in preparation for the degree of Bachelor of Philosophy or Bachelor of Arts.

The Courses of Instruction in Curriculum A, and the following in addition:

First Year.			*Second Year.*		
History, 3, 4, 5	page	33	English, 5, 6	page	32
Physics, 1½, 3, or	"	44	History, 1, 2	"	33
Chemistry, A, B, C	"	46	Mathematics, 10, 11	"	36
Latin, 7, 8, 9	"	50	Latin, 10, 11, 12	"	50
German, 4, 5, 6, or	"	53	German, 7, 8, 9, or	"	53
French, 4, 5, 6, or	"	55	French, 7, 8, 9, or	"	55
Greek, 1, 2, 3	"	51	Greek, 4, 5, 6	"	52

CURRICULUM E. Recommended to candidates for the Academic Certificate in the *Science Group* as a final certificate, or in preparation for admission to the SCHOOL OF ENGINEERING.

The Courses of Instruction in Schedule A, and the following in addition:

First Year.		*Second Year.*	
History, 3, 4, 5	page 33	English, 5, 6	page 32
Mathematics, 7, 8, 9	" 36	Mathematics, 10, 11, 12	" 36
Physics, 1½, 3	" 44	Chemistry, 1, 2, 3	" 46
Engineering, 1, 3, or	" 38	Engineering, 4, 6, 7, or	" 38
Domestic Economy, A, B	" 56	Domestic Economy, 6, 7, 8	" 56

Collegiate Division.

The work of the Collegiate Division is arranged in the *Science Group,* in which students may prepare for the third year of a college course leading to the degree of Bachelor of Science; and the *Literature Group,* in which students may prepare for the third year of college courses leading to the degrees of Bachelor of Arts and Bachelor of Philosophy.

In the Collegiate Division, a *credit* signifies the successful completion of a course of instruction that continues for twelve weeks, and requires from twelve to fifteen hours a week, counting time of preparation and recitation.

REQUIREMENTS FOR TITLE OF ASSOCIATE.

To obtain the Title of Associate in Science, the student must secure 60 credits, as follows:

English, 1, 2, 3, 5, 6, 7, 8, 9	8	credits.
History	3	"
Mathematics, 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 15	11	"
Physics, 1, 2, 3, 6, 7, 8, and Chemistry, 1, 2, 3, or		"
Physics, 1, 2, 3, and Chemistry, 1, 2, 3, 4, 5, 6, or 4, 7, 8	9	"
Latin, or German, or French (two or three languages)	15	"
Foreign Languages, or Engineering, or Domestic Economy	9	"
Elective	5	"

To obtain the Title of Associate in Literature, the student must secure 60 credits, as follows:

English, 1, 2, 3, 5, 6, 7, 8, 9	8	credits.
History	3	"
Mathematics, 1, 2, 3, 4, 5, 10, 11, 12, 13, 14	10	"
Physics, 1, 2, 3, and Chemistry, A, B, C, or 1, 2, 3	6	"
Latin	15	"
German, or French, or Greek (two languages)	14	"
Elective	4	"

SUGGESTIVE COLLEGIATE CURRICULA.

CURRICULUM F. Recommended to candidates for admission to the Junior Year in colleges that offer courses leading to the degree of Bachelor of Science.

The Courses of Instruction in Curricula A and C, and the following in addition:

First Year.		*Second Year.*	
English, 7	page 32	English, 8, 9	page 32
Mathematics, 13, 14	" 36	History, 9, 10, 11	" 34
Physics, 6, 7, 8, or	" 44	Mathematics, 15	" 37
Chemistry, 4, 5, 6, or 4, 7, 8	" 47	Biology, 3, 4, 5, or	" 48
German, 1, 2, 3, 4, 5, or	" 53	German, 6, 7, 8, 9, or	" 53
French, 1, 2, 3, 4, 5	" 54	French, 6, 7, 8, 9	" 55

CURRICULUM G. Recommended to candidates for admission to the Junior Year in Colleges that offer courses leading to the degree of Bachelor of Philosophy.

The Courses of Instruction in Curricula A and D, and the following in addition:

First Year.		*Second Year.*	
English, 7	page 32	English, 8, 9	page 32
History, 9, 10	" 34	Mathematics, 14	" 37
Mathematics, 12, 13	" 36	Latin, 15	" 50
Latin, 13, 14	" 50	German, 6, 7, 8, 9, or	" 53
German, 1, 2, 3, 4, 5, or	" 53	French, 6, 7, 8, 9	" 55
French 1, 2, 3, 4, 5	" 54	Physics, 6, 7, 8, or	" 44
		Chemistry, 1, 2, 3	" 46

CURRICULUM H. Recommended to candidates for admission to the Junior Year in colleges that offer courses leading to the degree of Bachelor of Arts.

The Courses of Instruction in Curricula A and D, and the following in addition:

First Year.		*Second Year.*	
English, 7	page 32	English, 8, 9	page 32
Mathematics, 12, 13	" 36	Mathematics, 14	" 37
Latin, 13, 14	" 50	Latin, 15	" 50
Greek, 8	" 52	Greek, 9, 10	" 52
German, 1, 2, 3, 4, 5 or	" 53	Physics, 6, 7, 8, or	" 44
French, 1, 2, 3, 4, 5	" 54	Chemistry, 1, 2, 3	" 46

CURRICULUM I. Recommended to candidates for Title of Associate in Science who are preparing to teach Domestic Economy.

The Courses of Instruction in Curricula A and C, and the following in addition:

First Year.		*Second Year.*	
English, 7	page 32	English, 8, 9	page 32
Chemistry, 4, 7, 8	" 47	Chemistry, 12	" 47
German, 6, 9	" 53	Biology 1, 2, 3	" 48
Domestic Economy A, B, C	" 56	Domestic Economy, 6, 7, 8	" 56

Special Courses of Instruction.

As a rule, students are expected to take up the work of some one of the groups outlined above, in which such choice of studies is allowed as is calculated to meet their needs. There may be those, however, who will be obliged to confine their work to one or two subjects of study. This may be done when the circumstances seem to justify it, subject to such conditions as may be imposed by the Director.

Time Requirement.

The time required for the completion of the work of any one of the groups of studies offered by the Institute will vary with different students, according to their ability, health, application, and time for study. Students whose school work has been in no way interrupted should be prepared for admission to the Institute at the age of thirteen years, and if able to give the working hours of the day to their school duties, they should complete the studies of any one of the Divisions in two years.

Half-Day and Evening Courses.

Many boys and girls are obliged to leave school in order to take care of themselves and those dependent upon them, at a time when their more fortunate associates enter upon such courses of instruction as are herein outlined. Such as can attend the Institute but half of each day may, by prolonging the time requirement, complete the work of some one group of studies, or at least perfect themselves in one or more subjects. Provision has also been made for such instruction at night as enables young men and women who are employed during the entire day to continue their education along those lines which will be of the most service to them in the work in which they are engaged.

The School of Engineering.

Admission.

Before entering the School of Engineering, students are advised to secure as complete a general education as time and means permit. Candidates for admission must offer as a minimum requirement work equivalent to the following courses, which are defined in the Register as indicated below:

English Literature and Composition.
English, courses 1-6, page 31.
English, United States, and Industrial History.
History, courses 3-5, page 33.
Algebra, Geometry, and Plane Trigonometry.
Mathematics, courses 1-6, 10-12, page 35.
Elementary and Laboratory Physics.
Physics, courses 1-3, page 44.
Woodwork and Machine Sketching.
Engineering, courses 1-2, page 38.
Modern Language.
French or German, courses 1-6, pages 53 and 54.

Courses Leading to the Degree of Mechanical Engineer.

The Courses of Instruction offered in the School of Engineering cover a period of four years, with such electives in the last two years as enable the student to specialize in either shop, steam, or electrical engineering.

FIRST YEAR.

Algebra, Trigonometry, and Plane Analytical Geometry.
Mathematics, courses 13, 14, 15, page 36—3 credits.

General Chemistry.
Chemistry, courses 1, 2, 3, page 46—3 credits.
Foundry Work, Projection Drawing, and Pattern Making.
Engineering, courses 4, 6, 7, 8, page 38—3 credits.
Modern Language.
French or German, courses 7, 8, 9, pages 53, 55—3 credits.

SECOND YEAR.

Differential, Integral, and Applied Calculus.
Mathematics, courses 16, 17, 18, page 37—3 credits.
General Physics and Electrical Measurements.
Physics, courses 6, 7, 8, page 44—3 credits.
Forge Work, Machine Shop Work, and Engineering Laboratory.
Engineering, courses 15, 19, 20, 21, page 39—3 credits.
Machine Sketching and Dimensioning, Descriptive Geometry, and Elements of Mechanisms.
Engineering, courses 11, 12, 25, 28, page 39—3 credits.

THIRD YEAR.

Statics, Dynamics, and Strength of Materials.
Engineering, courses 16, 17, 18, page 39—3 credits.
Machine Tool Work, Valve Gear and Steam Engine Design.
Engineering, courses 23, 31, 32, page 40—3 credits.
Theory and Design of Electrodynamic Machinery.
Engineering, courses 34, 37, 38, page 41—3 credits.
Electives in Engineering—3 credits.

FOURTH YEAR.

Thesis	4 credits.
Engineering Laboratory	3 "
Electives	3 "

The time given to thesis work in the fourth year, 720 hours, makes possible a line of investigation requiring sustained application under conditions favorable to the securing of data that may be of value to the student in his subsequent career. While the electives are designed to enable the student to specialize in some branch of engineering, he may select any courses in other departments that are likely to contribute to his future success.

Courses of Instruction.

English.

Instruction is offered in English grammar, composition, oral reading, public speaking, and literature.

The historical grammar of English is not presented formally at any point in the course, but daily drill is given in matters of correct conversational usage.

In the teaching of composition the aim is to develop in the student the largest possible amount of practical power—the ability to present his own thoughts in clear and orderly fashion.

Throughout the course, practice is given in oral reading. No attempt is made to cultivate the elocutionary graces. Simple and intelligent reading is found to be an end sufficiently difficult to attain.

Throughout the course, weekly practice is given in public speaking. The pupil is expected to face the class and speak to it with simplicity and directness. He is urged to choose topics in connection with which he can appeal to his audience for definite action.

In most of the literary courses, masterpieces are chosen and presented with reference to the ascertained interests and ideals of the student. In courses 5 and 6 this principle is partly subordinated to the "uniform college entrance requirements."

PREPARATORY DIVISION.

1. The chief object of Course One is correctness in speaking and writing English, but instruction is also given in oral reading, public speaking, and literature. This course continues throughout the first year, occupying one or two hours daily, according to the needs of the individual student. The work is all done in the class room.

2. Course Two continues through the second year, and is similar in nature to Course One.

ACADEMIC DIVISION.

3. Composition. In this course especial attention is paid to matters of correctness in elementary composition. Students who have done good work in the preceding courses, and who take English history on completing English 2, are excused from English 3.

Autumn Quarter.

4. COMPOSITION. The drill begun in course 3 is continued in course 4 for students who especially need it, or who prefer to take it before attempting course 5. Students entering the Institute with advanced standing are frequently assigned to this course to prepare for 5. Course 4 is not required of students who do good work in courses 1 and 2, and who then take English history. *Spring Quarter.*

5. LITERATURE AND COMPOSITION. The following masterpieces will be studied in 1902-1903; Shakspere's *Macbeth;* Milton's *L'Allegro, Il Penseroso, Comus, and Lycidas;* Burke's *Speech on Conciliation with the American Colonies;* Macaulay's *Essay on Milton* and *Essay on Addison.* *Autumn and Winter Quarters.*

6. LITERATURE AND COMPOSITION. The following masterpieces will be read in 1902-1903: Shakspere's *Merchant of Venice* and *Julius Cæsar;* Addison's *Sir Roger de Coverley Papers;* Goldsmith's *The Vicar of Wakefield;* Coleridge's *The Ancient Mariner;* Scott's *Ivanhoe;* Carlyle's *Essay on Burns;* Tennyson's *The Princess;* Lowell's *The Vision of Sir Launfal;* George Eliot's *Silas Marner.*

Winter and Spring Quarters.

COLLEGIATE DIVISION.

7. RHETORIC AND ENGLISH COMPOSITION. This course lays stress upon the structure of the whole composition, the paragraph, and the sentence. It affords practice in writing by twelve themes, illustrating the following species: Narration, description, translation, summary, exposition, argument. *Autumn Quarter.*

8. ENGLISH LITERATURE. This course is meant to serve as an introduction, first to the theory of the elements of literature, and secondly to representative masterpieces of prose and poetry, considered in their chronological order. Daily written work is required, in the form of brief criticisms and interpretations. *Winter Quarter.*

9. ENGLISH COMPOSITION. The object of this course is threefold: To give a more technical theory of composition than that of course 7; to afford some practice in the construction of long themes, and to secure fluency by daily themes illustrating many types. Much personal consultation is required. *Autumn and Spring Quarters.*

10. SHAKSPERE. In 1901-2 the following plays were read, with a minimum of textual criticism, and a maximum of attention to Shakspere's art: *Romeo and Juliet, Henry IV.* (Part I), *Twelfth Night, Coriolanus, King Lear, Antony and Cleopatra, The Tempest, The Winter's Tale.*

11. THE ENGLISH ESSAY. A rapid survey is attempted of the history of the essay as an exponent of life and thought, particularly that of the present century.

12. PUBLIC SPEAKING. In connection with courses 7, 8, 9, and 10,

a sum total of forty-eight speeches is required of every student. This work is additional to the requirements of 7, 8, 9, and 10.

History.

The work in history, as outlined below, is designed to secure two results: first, a knowledge of the important facts of history; and second, the discipline and training that come from the nature of the subject-matter studied. In all courses special attention is given to correct methods of study and to the orderly arrangement and causal nexus of historical facts as a basis for subsequent work.

Courses 3, 4, and 5 are regarded as the essential part of the academic work. They are united in such a way as to form a connected history of the English-speaking people in Europe and America. Course 5 is a partial review and a continuation of courses 3 and 4, with more attention given to industrial and commercial growth, and relations. It is believed that the study of this phase of history, undertaken in this way, may be made more effective because of the opportunity for direct comparison.

Students may select, after consultation and approval, one or more of the three groups formed of courses 1 and 2, of courses 3 and 6, and of courses 4 and 7.

Courses 9, 10, and 11 in the Collegiate Division have for their subject-matter the general history of Europe from the fourth century to the present time.

Courses 8 and 12 are elective, and are continuations of the academic and college courses respectively.

ACADEMIC DIVISION.

1. History of Greece. In this course emphasis is placed upon the period of Greek history from the Persian wars to the Roman conquest, and upon those features of Greek life and civilization which became the common property of the East and of Rome.

2. History of Rome. The early republic, the territorial expansion and political development of Rome, the causes of the fall of the republic, the earlier and later empire form the subject-matter of the course. As far as possible, the time is divided equally between the republic and the empire.

3. History of England. This course covers the period of English history to the accession of George III., with the history of the English colonies in America. Besides giving a general knowledge of the subject, the aim of the course is to give such a knowledge of English political history as is necessary for course 5.

4. History of the United States. The course includes the colonial period from the accession of George III.; the progress of the

colonies toward independence and union; the growth of the constitution, and the history of government under the constitution to the close of the reconstruction period. As in course 3, especial attention is given to those features of our history necessary for course 5.

5. ENGLISH AND AMERICAN INDUSTRIAL HISTORY. A review of courses 3 and 4, with especial attention to the growth and development of agriculture, manufacture, and commerce, with some attention to the definition of economic terms and the fundamentals of economics.

6. HISTORY OF ENGLAND. The subject-matter of this course is the history of England from the beginning of the Puritan movement to the present time. Special and intensive work is done upon selected topics and periods. Prerequisite: *Course 3.*

7. HISTORY OF THE UNITED STATES. Special and intensive study of the subject from 1850 to the present time, with a review of the principal facts of political history and industrial development. Prerequisite: *Course 4.*

COLLEGIATE DIVISION.

8. CIVIL GOVERNMENT OF THE UNITED STATES. An analysis of the structure and working of government in the United States, local, state, and national. The text of the constitution is explained in the light of the present system, based when possible on court decisions.

9. EUROPE FROM THE FOURTH TO THE FOURTEENTH CENTURY. An outline course in general European history covering the period from the Council of Nicea to the removal of the Papacy to Avignon, treating in such detail as the time will permit the civilization and institutions peculiar to the period.

10. EUROPE FROM THE FOURTEENTH TO THE EIGHTEENTH CENTURY. From the exile to Avignon to the close of the Seven Years' War. An outline study of the Renaissance, Reformation, Counter Reformation, Religious and Dynastic wars, and the struggle for colonial and commercial supremacy.

11. EUROPE SINCE 1763. The effect of the American Revolution on Europe, attempts at reform, the French Revolution, Napoleon, the Holy Alliance, reforms in England, and the unity of Germany and Italy are some of the subjects that will be considered in the course.

12. THE FRENCH REVOLUTION. A study, as detailed as possible in the time, of the history of France from the meeting of the States General to the establishment of the Directory. The design of courses 11 and 12 is to give an opportunity for more intensive study than has been possible in the other courses.

Mathematics.

A continuous and progressive course in pure mathematics for five years is offered, an outline of which is given below.

In the third year of the course, when students have some knowledge of elementary algebra, plane geometry, and trigonometry, ample opportunity is given to apply their knowledge in the study of physics; and in the sixth year students in engineering will have abundant use for their knowledge of mathematics obtained during the five years preceding.

Both the disciplinary and the practical purposes of mathematics will be kept in view, and an earnest attempt will be made to give due emphasis to each.

By repetition and reviews, it is believed, facility in the ready and masterly use of mathematics may be obtained, and the course, as a whole, has been planned with this purpose in view. Thus algebra is introduced in three distinct places in the course, geometry in three, trigonometry in two.

PREPARATORY DIVISION.

1. ELEMENTARY ALGEBRA. Definitions and notations, positive and negative numbers, addition and subtraction of algebraic expressions, parentheses, multiplication and division, simple equations, factoring, highest common divisor, lowest common multiple.

Autumn and Winter Quarters.

2. ELEMENTARY ALGEBRA, four days a week. Fractions, simple equations containing fractions, simple simultaneous equations, inequalities, involution and evolution. CONCRETE GEOMETRY one day a week.

Winter and Spring Quarters.

3. ELEMENTARY ALGEBRA, four days a week. Theory of exponents, radicals, quadratic equations, simultaneous equations involving quadratics, theory of quadratic equations, ratio and proportion. CONCRETE GEOMETRY, one day a week. *Spring Quarter.*

4. PLANE GEOMETRY. Elementary definitions, triangles, parallels, parallelograms, problems, loci of points. The geometric concepts should have been well fixed in mind during the two preceding quarters. In this course the emphasis is to be placed on the logical demonstration of the theorems, and solutions of problems.

Autumn and Winter Quarters.

5. PLANE GEOMETRY, four days a week. Equality of polygons, circles, inscribed and circumscribed triangles and quadrilaterals, ratio and proportion, similar figures. Especial emphasis is placed on original exercises. Geometrical drawing, one day a week.

Winter and Spring Quarters.

6. ELEMENTARY PLANE TRIGONOMETRY. Trigonometric functions

of acute angles, trigonometric functions of angles in general, general formulas, logarithms, solution of right triangles, general properties of triangles, solution of oblique triangles.

Autumn and Spring Quarters.

7. ACCOUNTING. A study of common and decimal fractions, addition, percentage, discounts, commission, insurance, exchange bills, settlements, averaging accounts, and profit and loss. Special work in mental calculations. *Autumn Quarter.*

8. ACCOUNTING. Introduction and use of main books used in accounting, and application of principles learned in course 7 to business transactions recorded in them. Exercises in opening and closing books, and practice in writing business papers. *Winter Quarter.*

9. ACCOUNTING. The continued use of main books and the introduction of auxiliary books. A study of partnerships with methods of keeping accounts; adjusting profits and losses, making settlements and summarizing results. Business correspondence. *Spring Quarter.*

9a. ACCOUNTING. Short methods; accounts of corporations, issue and transfers of stock, assessments and dividends. Banking business so far as is necessary to give the student an understanding of the position taken by a bank in business economy, and to enable him to deal intelligently with relations between a business house and a bank.

Spring Quarter.

ACADEMIC DIVISION.

10. ELEMENTARY ALGEBRA, *reviewed and completed.* A review and more thorough study of the fundamental operations. The solution of equations, the theory of exponents and surds. Theory of quadratic equations, indeterminate equations of the first degree, inequalities, ratio and proportion. *Every Quarter.*

11. PLANE GEOMETRY, *reviewed and completed,* with special emphasis on original problems and demonstrations. In this course the topics that were omitted in course 5 will be studied, viz., the theory of limits, pencils, mensuration of plane figures, partition of the perigon, regular polygons, mensuration of the circle, maxima and minima.

Winter and Spring Quarters.

12. SOLID GEOMETRY. Lines and planes in space, pencil of planes, polyhedral angles, polyhedra, parallelopipeds, prisms and pyramids, the cylinder, cone, and sphere, similar solids. *Spring Quarter.*

COLLEGIATE DIVISION.

13. ALGEBRA. Progressions, permutations, and combinations, the binomial theorem, limiting values and vanishing fractions, convergency and divergency of series, undetermined coefficients, summation of series, introduction to the theory of equations.

Autumn and Winter Quarters.

14. TRIGONOMETRY. A brief review of the fundamental formulas of plane trigonometry and their applications. Spherical trigonometry, trigonometric equations and series, exponential and logarithmic series. *Winter and Spring Quarters.*

15. PLANE ANALYTICAL GEOMETRY. Systems of co-ordinates; the equations and properties of the point, straight line, circle, parabola, ellipse, and hyperbola; the general equation of the second degree. *Spring Quarter.*

16. DIFFERENTIAL CALCULUS. The elements of differential calculus. *Fall Quarter.*

17. INTEGRAL CALCULUS. The elements of integral calculus. *Winter Quarter.*

18. APPLIED CALCULUS. Applications of calculus to the integrations most frequently required in engineering subjects; intended to familiarize the student with the use of calculus as a practical instrument in mechanics, thermodynamics, and electricity. *Spring Quarter.*

Engineering.

The work classified under this head embraces applied mathematics, applied electricity, testing of machinery and instruments, drawing and designing, shop practice, and machine construction.

The aim is to present these subjects in such order and comprehensiveness as to meet the requirements of those who complete the courses and those who do not, enabling some to throw their entire energy into professional studies and others to receive the fundamental instruction necessary for practical work on leaving the Institute.

While the work outlined has direct bearing on the training of the mechanical engineer, the student who expects to follow any branch of engineering or architecture will find much that will be of service in his subsequent work.

The location of the Institute allows advantage to be taken of extensive and varied manufacturing establishments, and throughout the four years there will be required of each student in the Engineering Courses monthly visits of inspection, under the direction of an instructor, to some shop where notes and sketches will be made. These trips will usually be made on Saturdays. A familiarity with constructive work on a scale and variety impossible in one shop will thus be obtained.

In the shops and in the drawing rooms of the Institute, methods and principles will be presented, when possible, by exercises of ultimate value as parts of machines or apparatus.

In shop and drawing room and laboratory work, time cards are made out daily by each student, stating the character of work done, materials, number of machine, and drawings used. These are kept on file and

transferred at the end of each six weeks to sheets, showing at a glance the variety of work performed, hours on different machines, etc.

PREPARATORY DIVISION.

1. FREEHAND SKETCHING. This course is designed to enable the student to work in perspective and simple projection. Sketches from memory and description will be a prominent feature of the work.
Every Quarter.

2. WOOD WORK. Uses and care of tools. Exercises in sawing, planing and laying out work. Application of the ordinary carpenter's and joiner's tools, such as saws, bench, rabbeting and moulding-planes, chisels, gouges, brace and bits, hammer, square, bevel, etc., in the construction of the principal joints used in carpentry and joinery. Center, face plate, screw and hollow chuck, and templet turning. Distinguishing characteristics of the various kinds of wood in ordinary use and the methods of finishing. *Every Quarter.*

2a. WOOD WORK. (*Advanced course.*) This course affords those who have gained some facility in the handling of carpenters' tools further practice in their use, and also an opportunity to do more advanced work. Applications of the principles given in Course 2 to methods of laying out and constructing frames of buildings, roofs, roof trusses, bridges, etc., doors, door frames, window sash and frames, stairs and stair railing, and various forms of apparatus for chemical, physical, and engineering laboratories.

3. FORGE WORK. Management of fire. Practice in drawing out, upsetting, bending, forming, fullering, swaging, punching, and welding of iron and mild steel. Tool-steel working, hardening and tempering. Illustrations of the effect of differences in the composition of iron and steel upon their mechanical properties, and the method of treating the different cases. *Every Quarter.*

4. FOUNDRY WORK. Preparing and mixing sand and facings, bench and floor mouldings of ordinary patterns; match plate work, making sand and plaster follow boards; making, baking, and setting cores; crucible melting; management of furnace, preparing charges of iron and brass; cleaning, lining, and charging cupola; melting, skimming, pouring, cleaning, and tumbling castings. *Every Quarter.*

5. INSTRUMENTAL DRAWING. This is the first work with drawing instruments and has for its aim the proper handling of instruments and some facility in line work. Especial attention is paid to accuracy of construction. *Every Quarter.*

6. PROJECTION DRAWING. The knowledge and use of planes of projection are taught in this course. In view of the use to which it may be later applied, the third angle will be used for most projections.
Every Quarter.

ACADEMIC DIVISION.

7. PATTERN-MAKING. Practice in the use of general wood-working machines, such as the surface planer, joiner, circular and band saws, lathe, trimmers, shoot-board, and the ordinary hand tools; in the preparation, cutting, fitting and gluing of stock used in the making of patterns, and the necessary core-boxes of angle and surface plates, collars, flanges, pipe fittings, valves, pulley rings, hand wheels, etc. *Every Quarter.*

8. PATTERN-MAKING (*Advanced course*). Application of the methods of the preceding course to the making of patterns for general machine work, including hangers, journal boxes, pulleys, sheaves, spur, bevel, and worm gears, machine details, engine frames, cylinders, valves, etc., match plates, follow boards, sweeps for loam work, skeleton core-boxes, and patterns.

9. FOUNDRY WORK (*Advanced course*). Floor moulding, including patterns of complicated form requiring the use of drawbacks, anchor plates, cheeks, etc.; dry sand, loam, and pit moulding, sweep work, and green sand core making. Mechanical properties of the different grades of pig iron and of their mixtures.

10. MECHANICAL DRAWING. Lettering and conventional representation of frequently recurring parts of machines, such as nuts, threads, fastenings, etc. This course is designed to establish standard methods of lettering, dimensioning, and conventional representations.

10a. MECHANICAL DRAWING. Continuation of Course 10.

11. MACHINE SKETCHING AND DIMENSIONING. Sketches of complete machines and of detailed parts made in perspective and projection, the dimensions being supplied from carefully made measurements. Students who have taken this course should be able to make a clear and neat working sketch with the dimensions properly placed.

12. WORKING DRAWINGS FROM SKETCHES. The making of finished working drawings from sketches made in the preceding course. This course is designed to teach certain well established modes in use by designers of machinery. All drawings are made in pencil, and some are afterward traced on cloth. *Spring Quarter.*

COLLEGIATE DIVISION.

15. ENGINEERING LABORATORY. Such work with engines, boilers, generators, motors, dynamometers, and testing machines as is needed to give the student that familiarity with them requisite to the intelligent study of electrodynamics, thermodynamics, mechanics, and machine design. *Spring Quarter.*

16. STATICS. Composition and equilibrium of concurrent forces; parallel forces and center of gravity; couples and composition and equilibrium of non-concurrent forces; suspended weights and catenary. *Autumn Quarter.*

17. DYNAMICS. Uniform motion, falling bodies, Newton's laws, and mass; accelerated motion; impact; virtual velocities; moment of inertia; work, energy, power; friction. *Winter Quarter.*

18. STRENGTH OF MATERIALS. Elementary stresses and strains, tension, compression, shearing, and torsion; flexure of beams; continuous girders; flexure of long columns. *Spring Quarter.*

19. BENCH METAL WORK. Clipping, filing, and polishing of cast and wrought iron and steel; laying out work, drilling, tapping, reaming, scraping flat surfaces to surface plate. Illustration and designation of the different shapes and cuts of files and the uses to which they are adapted.

20. MACHINE TOOL WORK. Explanation of the construction of the different forms of machine tools; directions for operating and keeping tools in order. Practice in centering, plain, taper, and templet turning, chucking, drilling, boring, external and internal thread cutting; hand tool turning, filing, polishing; planing, shaping, plain milling; forms of cutting tools and instructions in grinding.

21. FORGE WORK (*Advanced course*). Tool dressing, hardening, and tempering in open fire, lead, sand bath, and oil; case-hardening; annealing; steam hammer work, faggot-welding, engine and machine forgings.

22. TOOL AND SCREW MAKING. Use of the lathe, drill press, planer, shaper, universal miller, universal grinders, hand tools, standard gauges, micronometer, and vernier calipers, in construction of accurate reamers, taps, dies, and straight, spiral, angular, side, end, and formed milling cutters, etc. Setting up and operating screw machine; making machine screws, nuts, studs, and formed work.

23. MACHINE TOOL WORK (*Advanced course*). Continued practice in the use of machine tools in the boring, turning, sizing, and cutting of spur, bevel, and spiral gears; worms and worm wheels. Planing, milling, scraping, fitting, and finishing the sliding surfaces and parts of machines.

24. MACHINE ERECTING. Practice in assembling, erecting, finishing, fitting, and adjusting complete machines.

25. DESCRIPTIVE GEOMETRY. Graphical methods of solving problems of intersections of lines, planes, surfaces, and solids, and developed shapes. Practical problems designed to secure facility in the application of principles.

26. DESCRIPTIVE GEOMETRY AND MECHANICAL PERSPECTIVE. This course is a continuation of the preceding and extends into mechanical perspective. The laws of perspective are studied and their application made in producing simple perspective drawings from projections.

27. MACHINE DRAWING. With the aid of handbooks of data and formulas, the use of which is encouraged in previous courses, this course will call for designs reproduced from cuts and photographs.

28. ELEMENTS OF MECHANISMS. The study of elementary combinations, pulleys, and belts, gearing, etc.

29. PRACTICAL KINEMATIC PROBLEMS. A study of the laws of motion, linkages, trains of gearing, and problems in the determination of combinations necessary to secure required motions.

30. MACHINE DESIGN. While the designing of parts of machines and elementary machinery forms a part of the preceding courses, at this period of advancement the student's knowledge of shop practice is such as to enable him to do more original work in collecting and applying data to individual problems.

31. VALVE GEAR DESIGN. The familiarity of the student with kinematics, and his previous practice in drawing are made use of in this course in the investigation of various valve gear motions, and applied to problems in actual designing.

32. STEAM ENGINE DESIGN. A study of the fundamental problems of steam engine design, such as the influence of the weight of reciprocating parts on steady running, etc. A theoretical design will be undertaken and compared with the practice of leading builders.

33. GRAPHICAL STATICS. Taught with special reference to the application of force and equilibrium polygons to problems of roof trusses, cranes, and frame structures.

34. THEORY OF ELECTRODYNAMIC MACHINERY. A course of lectures dealing with the elements of dynamo machinery and laboratory practice in its use for lighting and power.

35. CONSTRUCTING AND TESTING OF DIRECT CURRENT MACHINERY. Lectures and laboratory practice in direct current dynamo testing, including the theory and use of instruments.

36. CONSTRUCTION AND TESTING OF ALTERNATING CURRENT MACHINERY. Lectures and Laboratory practice in alternate current machinery testing.

37. DESIGN OF ELECTROMAGNETS AND DIRECT CURRENT MACHINERY. A course in mechanical, magnetic, and electrical calculations for special machinery with practice in construction and tests of design in Laboratory.

38. DESIGN OF ALTERNATING CURRENT MACHINERY AND APPLIANCES. Complete calculations for alternators and transformers with practice in construction and tests of original and commercial machinery.

39. ELECTRIC TRANSMISSION. Theory of electric transmission; insulation and insulators; measurement of insulation resistance; location of faults.

40. PROBLEMS IN ELECTRIC TRANSMISSION. Direct current, single phase and polyphase; methods of distribution as applied to electric lighting and transmission of power; effects of the different methods on first cost and operating expenses.

41. THE TELEGRAPH, TELEPHONE, AND ELECTRIC SIGNALING. Theory and practice.

42. HYDRAULICS. The law governing fluids in motion, flow of water through orifices and pipes, losses of head by friction; hydraulic motors and their efficiencies.

43. THERMODYNAMICS. Mechanical theory of heat; laws of thermodynamics as applied to heat engines and refrigerating machines; analysis of the action of injectors and other steam apparatus.

44. STEAM BOILERS. The various forms and peculiarities of modern boilers, the proportion of heating surface, grate areas, and chimney capacity, as related to the best performance under various conditions; the various apparatus related to boilers.

45. LABORATORY ENGINE TESTS. Calorimeter tests for determining the quality of steam; boiler efficiency tests; similar tests of steam and power pumps under various conditions, such as are likely to occur in practice.

46. TESTING MACHINE PRACTICE. Tests of materials of construction; determining the elastic limit and ultimate strength under tension, compression and torsion.

47. HYDRAULIC MACHINERY TESTS. Hydraulic experiments in the flow of water through pipes and orifices; pumps of various kinds tested for the duty performed under known conditions of power furnished by steam or mechanically transmitted power.

48. POWER MEASUREMENT TESTS. Measurement of power by rope, hydraulic, and Prony brakes; use of Morin, Weber, cradle, floating, and other forms of transmission dynamometers.

49. POWER PLANT TESTS. Complete tests of power plants from the weighing of the coal to the worked up reports of condition, arrangement, and general efficiency of boilers, engines, generators, and motors.

Physiography.

In the courses in physiography and geology, lectures, recitations, and laboratory methods of work are used. The student is not confined to a single text-book, but is required to consult different authors. Maps, charts, and lantern views are freely used, and the students are encouraged to draw upon their store of mental pictures of familiar landscapes. So far as possible general principles are deduced from the facts thus brought out. Each pupil is required to give definite expression to his ideas through recitations, written descriptions, sketches, and diagrams, and by moulding in sand. Opportunities are afforded for field excursions under the guidance of the instructor. The aim of the instruction is the training of the powers of observation and reasoning, as well as the acquisition of useful information. To aid in the carrying out of this

plan, the department possesses a large assortment of topographical maps, geological maps, coast and river survey charts, relief models, weather maps, lantern views, facilities for moulding the land forms, and the more important books of reference.

PREPARATORY DIVISION.

1. PHYSIOGRAPHY. The motion of the earth and its relation to the sun and moon; elementary meteorology and climatology; distribution, movements, and deposits of the ocean. *Winter Quarter.*

2. PHYSIOGRAPHY. The land: The modern doctrines of the origin and development of the surface features of the earth, the agencies involved, and the resulting forms are carefully studied and classified. A limited number of field excursions are made.

Autumn and Spring Quarters.

Course 2 may precede or follow course 1, according as the work is commenced in the autumn or winter.

COLLEGIATE DIVISION.

3. PHYSIOGRAPHY. The equivalent of Courses 1 and 2. Open to students who have not had Physiography in the Preparatory Division.

Spring Quarter.

4. GENERAL GEOLOGY. The elementary features of dynamical, structural, and historical geology. Emphasis is placed upon the leading facts and principles of the science, and the more important events of geological history.

Prerequisite: *Courses 1 and 2, or Course 3; Physics 1-3 and Chemistry 1-3, or their equivalent.*

5. PHYSIOGRAPHY AND COMMERCIAL GEOGRAPHY OF THE UNITED STATES. A study of the physiographic features of the United States, with reference not only to their present form, but also to the successive stages of their development, and their effect upon mankind; the effect of natural resources and physiographical features on the location of cities and in determining the industries, the lines of transportation, and the prosperity of the people. Lectures, recitations, library and laboratory work .

Prerequisites: *Courses 3 and 4, or their equivalent.*

6. METEOROLOGY. Observational study of atmospheric phenomena supplemented by lectures, recitations, and reference work, by which an intelligent comprehension of the facts and theories of the science is gained. A part of the observational work will be done in connection with Courses 4 and 5.

Courses 4, 5, and 6 are designed to afford a continuous year's work in the study of the earth, and should be elected as a unit.

Physics.

The work of the department consists of elementary and advanced courses in general physics, together with special courses for students in engineering.

The design of the courses of the Academic Division is to familiarize students with the elementary principles of physics, and to cultivate correct methods of laboratory work, and also to serve as an introduction to applied mathematics. Attention is given to the preparation of records, the manipulation of apparatus, and to the cultivation of the patience necessary to secure the best results.

The courses in the Collegiate Division may not be taken until the student has had such work in mathematics as will enable him to solve the problems that arise in lecture discussion and detailed laboratory practice. These courses are designed for students who intend to specialize in physical science or in engineering.

ACADEMIC DIVISION.

1½. ELEMENTARY PHYSICS. *Mechanics:* A discussion and illustration of physical quantities and their measurement; simple types of motion; density, velocity, acceleration, force, work, and power; elasticity and surface tension. *Heat:* Thermometer, expansion, calorimity, change of state, solutions, transference of heat, and theory of gases.

LABORATORY PHYSICS. Strictly quantitative, covering the usual subjects in mechanics and heat. *Winter Quarter.*

3. ELEMENTARY PHYSICS. *Electricity:* Electrification, the electric field, electrostatic instruments, electric discharges, magnetism; the electric current, the electromagnetic field, relations between heat and electricity, units, telegraph and telephone, and electric waves. *Sound:* Waves, sounds and their relations, sonorous bodies, compound tones and musical instruments. *Light:* Nature and propagation, reflection, refraction, theory of optical instruments, interference, dispersion, radiation and absorption of light waves, color, and polarization.

LABORATORY PHYSICS. Quantitative measurements in electricity, sound, and light. *Spring Quarter.*

COLLEGIATE DIVISION.

6. GENERAL PHYSICS. Standard units; dimensions of dynamical units; properties of matter; measurements of precision in length, mass, and time; general mechanics. *Autumn Quarter.*

Prerequisite: *Mathematics, 6.*

7. GENERAL PHYSICS. Sound, heat, light; kinds of vibrations; media of propagation; measurement of sound waves and light waves; interference, reflection, and refraction of waves; physical theory of music; thermodynamics, ether dynamics; photometry. *Winter Quarter.*

8. General Physics. Electricity; electrostatics; magnetism; mapping magnetic fields; magnetic units; measurement of the earth's magnetic field; electromagnetism; electromagnetic units; introduction to electric measurements; electrodynamics; electromagnetic theory of light; photometry. *Spring Quarter.*

9. Electrical Measurements. Resistance, current, electro-motive force; quantity and capacity; temperature coefficients.

Prerequisite: *Course 8.* *Autumn Quarter.*

10. Advanced Electrical Measurements. Temperature coefficients; quantity and capacity; self and mutual induction; magnetic properties of iron. *Winter Quarter.*

Prerequisite: *Course 9 and Mathematics 16.*

11. Primary and Secondary Batteries. Historical development; theory; construction and reactions, testing, care, and maintenance; types and usages. *Spring Quarter.*

Prerequisite: *Course 8 and Chemistry, 1.*

12. Electro-Metallurgy. Testing of primary and secondary batteries; electroplating; the deposition of metals from their ores, and the separation of salts.

Prerequisite: *Course 8 and Chemistry, 1.*

13. Theories of Physics. Advanced course in heat, sound, or light, supplemented by research work in the laboratory.

Prerequisite: *Course 8 and Mathematics, 17.*

Chemistry.

The aim of the courses in chemistry is to give in the first place a knowledge of the fundamental principles of the science as a part of a general education; and afterwards a more extended knowledge of the subject and practice in manipulation to those who wish to devote themselves to pure or applied chemistry, or whose work along other lines will be made more efficient by a thorough training in chemistry. In the advanced work in chemistry a reading knowledge of German is assumed. Engineering students are encouraged to become familiar with the principles on which manufacturing processes or industrial methods are based, so that a firm foundation is laid for subsequent specialization in these directions. Opportunities are given for excursions to the plants of chemical industries located in and near Chicago.

All students taking courses in chemistry are required to deposit two dollars each quarter to cover charges for breakage. If the charges do not amount to the sum deposited, the excess is returned to the student.

PREPARATORY DIVISION.

The courses in elementary chemistry aim to develop the reasoning and observational powers of the student on scientific lines, and lead him

by actual experiment to acquire a knowledge of the more important substances, possessing an economic interest, that are encountered in daily life. Most of the time is devoted to laboratory work, the recitations being chiefly utilized for systematizing the results thus obtained.

Lectures and recitations, four hours a week; laboratory work, six hours a week.

A. ELEMENTARY CHEMISTRY. General introduction; physical and chemical properties characteristic of the states of matter; chemical separation: water, air, etc. *Autumn Quarter.*

B. ELEMENTARY CHEMISTRY. Continuation of Course A. Study of some of the non-metals and their more important compounds. *Winter Quarter.*

C. ELEMENTARY CHEMISTRY. Continuation of Course B. Completion of the non-metals. Introduction to some of the more important metals. *Spring Quarter.*

COLLEGIATE DIVISION.

The courses in general chemistry give a knowledge of the natural occurrence, methods of preparation, properties and reactions of the important elements and compounds, explain these facts according to modern theories, and point out their application to industrial processes. Instruction is given by means of lectures and recitations, illustrated by experiments whenever advantageous. In connection with each subject studied the student is required to read some standard work. The greater part of the laboratory work is qualitative, but it includes quantitative experiments involving both gravimetric and volumetric methods, and also a few inorganic preparations on a somewhat elaborate scale. Lectures and recitations, five hours a week; laboratory work, ten hours a week. Reference book, Newth's Inorganic Chemistry.

Prerequisite: *Courses A-C or Physics 1-3.*

1. GENERAL CHEMISTRY. Chemical change, three states of matter, solution and crystalization, elements and compounds, oxygen, hydrogen, and the elements of the chlorine group. *Autumn Quarter.*

2. GENERAL CHEMISTRY. Continuation of Course 1. The remaining non-metallic elements; acids, bases, and salts; electrolysis. *Winter Quarter.*

3. GENERAL CHEMISTRY. Continuation of Course 2. The metals. Qualitative analysis is not taught, but some of the more important analytical reactions are studied, so that at the end of the course the student is expected to be able to recognize any simple salt and to understand the methods of separation of various groups and elements. *Spring Quarter.*

The work in chemistry of the second year begins with Course 4, one quarter of qualitative analysis given in the fall. This Course is prerequisite to all more advanced work. At the beginning of the Win-

ter Quarter the students are divided into three groups. Those intending to pursue chemical studies beyond this year take Courses 5 and 6, advanced qualitative and beginning quantitative. Those preparing for medicine or domestic economy, and those who wish a more general knowledge, take Courses 7 and 8, organic chemistry. Engineering students take Courses 6 and 9, beginning quantitative and analysis of engineering materials.

The courses in qualitative analysis begin with simple analysis and lead to the study of complex mixtures, minerals, alloys, etc. They include the methods of the recognition of the more common organic acids, and of various other substances of special interest and importance to medical students, together with toxocological work. The lectures treat in considerable detail of certain selected portions of theoretical and historical chemistry, special reference being made to the basis of analytical chemistry. Laboratory work, twelve hours a week; lectures and recitations, three hours a week. Text-book, Prescott and Johnson's Qualitative Analysis.

Prerequisite: *Courses 1-3.*

4. QUALITATIVE ANALYSIS. Lectures on the theory of analysis. General analysis, including that of complex mixtures and minerals.

Autumn Quarter.

5. QUALITATIVE ANALYSIS. Continuation of Course 4. Analysis of alloys, etc. Toxocological methods. Lectures on theoretical chemistry.

Winter Quarter.

6. QUANTITATIVE ANALYSIS. Continuation of Course 5. Simple gravimetric and volumetric exercises leading to Course 9. Lectures and recitations on quantitative analysis. Reading of selected books and original memoirs. The books read during the past year were Von Meyer's History of Chemistry, Wurtz's History of Chemical Theory, Pattison Muir's Heroes of Science, Roscoe's John Dalton, Alembic Club Reprints—Nos. 2, 4, 7, 8, 9, 13.

Winter and Spring Quarters.

The courses in organic chemistry consist of lectures and recitations on the simpler types of carbon compounds, and their preparation and purification in the laboratory. Lectures and recitations, three hours a week; laboratory work, twelve hours a week.

Prerequisite: *Courses 1, 2, 3, and 4.*

7. ORGANIC CHEMISTRY. The work is based on Perkin and Kipping's Organic Chemistry. Aliphatic series. *Winter Quarter.*

8. ORGANIC CHEMISTRY. Continuation of Course 7. Aromatic series. *Spring Quarter.*

The courses in quantitative analysis include exercises in gravimetric, volumetric, and electrolytic methods and gas analysis. Theoretical work consists in the study of prescribed books and memoirs supplemented

when necessary by lectures and recitations. Laboratory work, twelve hours; lectures and recitations, three hours a week.

9. QUANTITATIVE ANALYSIS. Moderately complex gravimetric methods and volumetric analysis, including iron, coal, water, and furnace gas analysis, if desired.

10. QUANTITATIVE ANALYSIS. Continuation of Course 9. Electrolytic separations and gas analysis. *Winter Quarter.*

11. QUANTITATIVE ANALYSIS. Continuation of Course 10. The course in this quarter is arranged to meet the individual demands of each student, who is thus enabled to specialize in any desired direction. *Spring Quarter.*

12. FOOD ANALYSIS. The testing of foods for quality and purity. Text-book, Leffman and Beam's Food Analysis. *Spring Quarter.*

Prerequisite: *Course 7.*

Biology.

COLLEGIATE DIVISION.

1. BIOLOGY. Cell theory, evolution, Karyokinesis, reproduction, development, regeneration. Typical species of animals with reference to structure, function, development, and relationships. Macroscopic and microscopic anatomy of representative animals and plants. Notes and drawings of forms studied. Preparation of material for microscopic study. Written thesis on some assigned subject.

Prerequisite: *Physics 1-3 and Chemistry 1-3.*

Autumn Quarter.

2. PHYSIOLOGY. Physiology of man and other higher animals Circulation, respiration, secretion, digestion, nutrition, muscles, animal heat, central nervous system, special senses. Comparative anatomy, laboratory work, dissection of typical animals.

Prerequisite: *Course 1.* *Winter Quarter.*

3. BACTERIOLOGY AND PHYSIOLOGICAL CHEMISTRY. Cultures and growth of germs. Disease, therapeutics, household and public sanitation.

Throughout the courses in Physiology and Bacteriology abnormal and pathological conditions of human organisms, and their relations to health, are considered.

Prerequisite: *Course 2.* *Spring Quarter.*

Latin.

The course of study in this department includes, in addition to the usual four years of training preparatory for college, all the work in Latin regularly required in the best colleges for the degree of A. B. The courses are planned with a view to the student's progressive development, and the acquisition of a constantly increasing grasp of the

language which shall enable him to read Latin with understanding and comparative ease and, in the later years of his course, with some amount of literary appreciation of the authors read.

Correct pronunciation with special regard to quantity is insisted upon from the beginning, so that by the time the student has reached the study of Latin poetry the hexameter should present little or no difficulty. In the acquisition of a vocabulary emphasis is laid upon the grouping of related words. Grammatical accuracy and familiarity with the principles of the language are sought rather through careful and constant practice in reading and writing Latin than by the memorizing of abstract rules.

With a view to the development of speed and facility in reading, special attention is paid to translating at sight and hearing, and to the practice of reading aloud in the Latin with a proper appreciation of the sense of the author. Translation from Latin into English is, from the beginning, regarded as a part of the student's work in English composition, and the careless or distorted use of English resulting from literal translation will not be allowed. The translation of English into Latin forms an important part of every course, exercises being based in the main upon the text read, but in the later years simple English narrative will be substituted. Literature is studied historically as an expression of the life of the people and with reference to the times and the circumstances under which the writers lived, and in the more advanced classes attention is paid to the elements of style and of literary criticism. Systematic supplementary reading is encouraged, for which ample opportunity is offered by a carefully selected library. The work of the classes will be supplemented by stereopticon lectures illustrating the monuments of Rome, Roman antiquities, historical sites, and Roman private life.

PREPARATORY DIVISION.

1, 2. ELEMENTARY LATIN. The student is introduced to the main principles of the Latin language by a series of graded exercises, intended to render him familiar with the elements of Latin grammar and syntax through their use in the Latin sentence rather than by memorizing abstract rules. Special attention is paid at the outset to correct pronunciation and the training of the ear.

Course 1, Autumn; Course 2, Winter Quarter.

3. ELEMENTARY LATIN. The reading of easy Latin and an outline study of Roman history to the time of the Empire. The work in history continues through Course 4. *Spring Quarter.*

4, 5. CAESAR, DE BELLO GALLICO. The Helvetian War, I, 1-29; The Belgian War, II; War with the Veneti, III, 7-16; Attack on Winter Quarters, V, 1-7, 24-55 For rapid reading, The General Uprising

in Gaul, VII, 1-31, 34-36, 41, 44-53, 63-90, or Cæsar's Invasion of Britain, IV, 20-36, V, 1-23. *Course 4, Autumn; Course 5, Winter Quarter.*

6. SELECTIONS FROM NEPOS. *Spring Quarter.*

ACADEMIC DIVISION.

7, 8. CICERO, ORATIONS AGAINST CATILINE, SALLUST, CATILINE. The orations of Cicero and Sallust's Catiline will form the basis of a study of the political and social conditions in Rome at the end of the Republic. That the student may feel in the Latin the spirit of the orations there will be frequent drill in reading aloud. In the work of Latin writing special attention will be paid during these two quarters to the writing of continuous narratives.

Course 7, Autumn; Course 8, Winter Quarter.

9. CICERO, PRO ARCHIA; PRO MARCELLO; SELECTED LETTERS. Prose writing as in Courses 7 and 8. *Spring Quarter.*

10. VIRGIL, ÆNEID, I, II. Special care is here given to the literary quality of the student's translations, and written translations of long passages are required. Formal drills in grammar are kept in the background so as to hinder as little as possible the student's interest in the story. Translations at sight, and weekly exercises in Latin writing.

Autumn Quarter.

11. VIRGIL, ÆNEID, III, IV. This course is a continuation of Course 10. *Winter Quarter.*

12. VIRGIL, ÆNEID, V, VI. Selections from Latin poetry. General review. Latin writing. *Spring Quarter.*

COLLEGIATE DIVISION.

13. CICERO, DE SENECTUTE. LIVY, Books I and II, or Books XXI and XXII. Latin writing. Collateral reading upon Roman history.

Autumn Quarter.

14. TACITUS, GERMANIA AND AGRICOLA. PLAUTUS, CAPTIVI OR TERENCE, PHORMIO. Latin writing. The history of Latin comedy. In connection with the study of the Germania, the accounts of early Teutonic institutions, given by Tacitus and Cæsar, will be compared.

Spring Quarter.

15. HORACE, SELECTIONS FROM THE ODES AND SATIRES. Collateral reading upon the history and literature of Rome in the time of Horace. *Winter Quarter.*

16. ROMAN PRIVATE LIFE. A systematic treatment of the life of the Romans with special reference to the first century of the Empire. The course will consist of lectures by the instructor (two days a week), illustrated by stereopticon views, and the reading of Pliny's Letters (three days a week). Each student will be expected to prepare, during the quarter, a paper on some social topic.

17. SELECTIONS FROM JUVENAL OR TACITUS. Outline study of the history of Latin literature.

Greek.

Courses 1-6 are based on the requirements for Collegiate credits (p. 26), as the college preparatory work usually covering three years is done in two years.

Academic students who have had two years in Latin may take these courses by such an arrangement of program as will allow the necessary twelve to fifteen hours a week. The six collegiate are equivalent to nine academic credits.

The following notes will indicate, somewhat in detail, the methods and the aims of the work in Greek, in Courses 1-6.

1. With a view to the acquisition of a comprehensive vocabulary, special attention is given to the grouping of related words and to the memorizing of the various meanings of all the common words.

2. Reading at sight and from hearing form an important part of the instruction from the first.

3. A correct and fluent pronunciation of the Greek sentence is insisted on.

4. Exercises in prose on the text read are prepared for each recitation in Attic Greek. This work is supplemented by frequent tests in writing Greek without previous preparation.

5. As soon as possible an effort is made to develop in the student, by means of essays and discussions, an appreciation of the historical and literary value of what he reads.

Courses 7-12 have been outlined and are conducted with special reference to the interests both of those students who wish a general training in Greek before proceeding to specialize in other lines of work, and of those who intend to make Greek the foundation or center of future specialization. It is believed that the courses offered, together with collateral reading and with discussions in the class room, will give a fairly broad idea of the scope of Greek literature and an appreciation of the relation of Greek to modern life and thought.

A careful review of the inflection and rules of syntax is made in connection with the study of Lysias. In all courses, particular attention is directed to sight reading and to the extension of the student's vocabulary, the aim being to cultivate the power to read rapidly at sight.

1. Elementary Greek. Emphasis is placed on the necessity of thoroughly mastering the essentials of the grammar. The fact that the student has had two years' training in Latin enables him to observe the similarities and differences between Latin and Greek, the value of this comparative study being that it makes the new language appear less strange and thus contributes materially to the learner's progress. The correct placing of accents and breathings is gained by constant practice in writing Greek. *Autumn Quarter.*

2. ELEMENTARY GREEK. Anabasis, Book I, chapters 1-3. Composition; grammar. The modification of verbal stems, euphonic changes, and drill in the principal parts of irregular verbs claim special attention. The student's observation is directed to the principles of composition and derivation as an important aid in acquiring a vocabulary. *Winter Quarter.*

3. THE ANABASIS, Books I, II (except I: 9 and II: 6). Greek writing; grammar. A review is made of the work of the preceding courses. Reading from sight and from hearing is emphasized. *Spring Quarter.*

4. THE ANABASIS, Books III, IV, I: 9, II: 6. Greek writing. Reading at sight and from hearing of selections from Book V. Discussion of literary and historical questions arising in connection with the reading of the Anabasis. Xenophon's life and literary work. *Autumn Quarter.*

5. HOMER, THE ILIAD, Books I and II. The essentials of the structure of Homeric verse and the resemblances and differences between the Homeric and Virgilian hexameter are noted. The relation of the Epic to the Attic Greek and the essentials of Homeric syntax receive special attention. The study of words. Exercises in reading Attic Greek and in writing Greek. *Winter Quarter.*

6. HOMER, THE ILIAD, Books III, VI, XXII and XXIV, exercises in the writing of Greek. Some attention is given to the "Homeric Question," which is more fully discussed in Course 9. *Spring Quarter.*

8. LYSIAS, Eight Orations. HERODOTUS, Selections from books VI and VII. Review of inflections and syntax. Composition. Collateral reading on history and on political antiquities. The rise of Attic oratory. *Winter Quarter.*

9. HOMER, THE ODYSSEY, Books I-XIII. The study of words. The "Homeric Question." Comparison of Homer and Virgil. *Autumn Quarter.*

10. PLATO, APOLOGY AND CRITO. XENOPHON, MEMORABILIA. Greek writing. Readings and discussions on (1) the rise of Greek philosophy, (2) Socrates and the Sophists, and (3) Plato and Socrates. *Spring Quarter.*

10a. XENOPHON, SYMPOSIUM. PLATO, SELECTIONS FROM THE PROTAGORAS, GORGIAS, EUTHYDEMUS, AND REPUBLIC. The writing of Greek. Collateral reading. (Alternates with Course 10.) *Spring Quarter.*

11. SELECTIONS FROM LUCIAN, DEMOSTHENES, PHILIPPICS. Lucian and his times. The development of Attic oratory. Demosthenes's importance in Greek literature and history. *Winter Quarter.*

12. SOPHOCLES, THE ANTIGONE AND ŒDIPUS TYRANNUS. The origin and development of the Greek drama. Outline study of the history of Greek literature. *Spring Quarter.*

13. ARISTOPHANES, THE ACHARNIANS AND THE CLOUDS. Lectures on the origin and development of Greek drama. The Greek theatre. *Two hours a week.* *Winter Quarter*

14. NEW TESTAMENT GREEK. The Gospel of John. Elective. *Two hours a week.*

German.

The aim of the instruction is not only to furnish the discipline derived from linguistic study but also to lay a thorough foundation which may serve either as an introduction to the study of one of the most important literatures of Europe, or as a means to the acquisition of information necessary in professional work. Colloquial practice is held to be important as an auxiliary to these ends and as furnishing a basis for a practical command of the language. The course of three years outlined below is begun in the second year of the Preparatory Division and continued through the Academic Division.

PREPARATORY DIVISION.

1. ELEMENTARY GERMAN. Drill on pronunciation; the inflection of articles, easily classified nouns, and weak verbs. Bierwirth's Grammar. *Autumn Quarter.*

2. ELEMENTARY GERMAN. Continued drill on the subjects of the preceding course. In addition the inflection of strong verbs, pronouns, the uses of the more common prepositions and the elementary rules of syntax and word order. Bierwirth's Grammar and Super's Reader. *Winter Quarter.*

3. ELEMENTARY GERMAN. Grammar as above with the addition of the inflection of adjectives and the simpler uses of the modal auxiliaries; conversational exercises. Reader continued. *Spring Quarter.*

ACADEMIC DIVISION.

4. ELEMENTARY GERMAN. Readings in easy narrative prose. Review of forms; the uses of tenses and modes; prose composition based on the texts read; conversational exercises. *Autumn Quarter.*

5. ELEMENTARY GERMAN. Narrative prose and easy poetry. Drill in grammar and prose composition continued; practice in sight reading. *Winter Quarter.*

6. ELEMENTARY GERMAN. Schiller's Wilhelm Tell. Drill in grammar and syntax; reproductive translation into German. *Spring Quarter.*

7. INTERMEDIATE GERMAN. German prose. Readings in history or biography. Jagemann's or Poll's German Composition. This course is conducted as far as possible in German. *Autumn Quarter.*

8. INTERMEDIATE GERMAN. Classical prose. Prose composition continued. *Winter Quarter.*

9. INTERMEDIATE GERMAN. Stories and comedies. Reproductive and original composition. Conversational exercises. *Spring Quarter.*

COLLEGIATE DIVISION.

When German is begun in the Collegiate Division the work of the elementary and intermediate grades is accomplished substantially in two years. The method of work and arrangement of subjects are essentially the same as described above. The courses of the first year are numbered 1, 3, 4½. The text-books used are Bierwirth's Grammar and easy prose texts. Courses 6, 7½, 9 fall in the second year. Course 6 is devoted to historical or biographical prose, course 7½ to some classical drama, and course 9 to modern prose and comedies. Prose composition, drill upon idioms, and conversational exercises are continued throughout the year.

9a. SCIENTIFIC GERMAN. This course is co-ordinate with German 9 in the literary course. No student is admitted who has not at least six credits in German. Scientific readers and monographs. Exercises in prose composition based on the texts read. *Spring Quarter.*

10. ADVANCED GERMAN. Goethe's dramas and prose writings. Studies in the life of the poet. Independent themes.

11. ADVANCED GERMAN. Schiller's Wallenstein and Thirty Years' War. Reference work in German histories and biographies.

12. ADVANCED GERMAN. Sudermann: Frau Sorge, Katzensteg, and Johannes.

French.

The language is studied for its disciplinary value and for the intrinsic worth of the literature, as well as for the advantage to the scientific student in availing himself of information to be found in French works relating to his special course. Power to speak and ability to read French are sought as a means to breadth of culture. A systematic knowledge of the structure and idioms is obtained through double translation. In all exercises attention is given to the correct use of English.

PREPARATORY DIVISION.

1. ELEMENTARY FRENCH. Rudiments of grammar; careful drill in pronunciation; repetition and memorizing of easy expressions, reading of anecdotes and short easy selections. Fraser and Squair's French Grammar. *Autumn Quarter.*

2. ELEMENTARY FRENCH. Grammar continued; drill on pronunciation; exercises, both English-French and French-English, designed to fix in the memory the forms and principles of grammar. *Winter Quarter.*

3. ELEMENTARY FRENCH. Grammar; special attention given to irregular verbs and idioms; frequent conversational exercises; Grand-

gent's French composition based on La Dernière Classe (Daudet); Sans Famille (Malot). *Spring Quarter.*

ACADEMIC DIVISION.

4. INTERMEDIATE FRENCH. Modern French prose. Reading, Colomba (Merimée); La Mare au Diable (Geo. Sand); Morceaux Choisis (Daudet-Freeborn); La Chute (Hugo); La Belle Nivernaise (Daudet); François' French Composition, exercises written and oral. Conversation based on text read; drill in verb forms and idioms. *Autumn Quarter.*

5. INTERMEDIATE FRENCH. Historical Prose. Reading Jeanne d'Arc (Lamartine); Histoire d'un Paysan (Erkmann et Chatrian); Le Siége de Paris (Sarcey); François, Composition continued; résumés of texts read. *Winter Quarter.*

6. INTERMEDIATE FRENCH. Modern French Comedies. Reading Moi (Labiche et Martin); Le Luthier de Crémone, Le Trésor (Coppée); Mlle. de la Seiglière (Sandeau); dictations; frequent résumés of texts read, and oral exercises on idioms drawn from the text; French Syntax and Composition, Bouvet. *Spring Quarter.*

7. ADVANCED FRENCH. Consideration of the Romantic School with special study of Victor Hugo. Reading Quatrevingt-treize and Ruy Blas; dictations; prose composition, Grandgent's French Composition, Part V.; letters, business and friendly. *Autumn Quarter.*

8. ADVANCED FRENCH. Modern French Lyrics. Reading; selections from Béranger, A de Musset, Victor Hugo, and Gautier; Eugénie Grandet (Balzac); study of idioms; prose, Grandgent's Composition, Part IV.; historical narration. *Winter Quarter.*

9. ADVANCED FRENCH. Consideration of the Classical School. Selected works of Molière, Corneille, and Racine. Reading: Les Précieuses Ridicules and l'Avare (Molière); Le Cid (Corneille); Athalie (Racine); Duval's Histoire de la Littérature Française is used throughout the year for the study of literature, with collateral reading from French critics. *Spring Quarter.*

10. ADVANCED FRENCH. History of the literature of the 17th century. Study of Corneille, Molière, Racine, Madame de Sévigné, La Fontaine. Collateral reading: Les Classiques (Pylodet); La Société Française au 17ième Siècle (Crane); Etudes sur les Classiques (Merlet, Lintilhac et Larroumet); French Literature (Demogeot); Littérature Française au 17ième Siècle (Albert); Old Paris (Jackson).

COLLEGIATE DIVISION.

Collegiate students who have not taken French in the early part of their course will cover in two years courses 1, 3, 4½, 6, 7½, and 9, substantially the same amount of work as that outlined above. Certain

changes, however, are made in the texts read in order to meet the requirements of more mature students. The following substitutions will be made: Le Gendre de Monsieur Poirier (Augier), La Question d'Argent (Dumas), Cyrano de Bergerac (Rostand), in modern French Comedy Course; Contes de Daudet (Cameron), in modern French Prose Course; Notre Dame de Paris (Hugo), in consideration of the Romantic School, and Taine's La France Contemporaire in Historical Prose Course.

Scientific works and periodicals will be read by pupils electing scientific courses.

Courses 1 and 6, *Autumn Quarter;* Courses 3 and 7½, *Winter Quarter;* Courses 4½ and 9, *Spring Quarter.*

Domestic Economy.

The attention of students who are preparing to teach domestic economy is called to the Suggestive Curriculum on page 27. Such a curriculum is also a good preparation for the professional study of nursing and medicine.

1. COOKERY. This course is designed for the younger pupils. It includes four hours a week of practical cooking, and three hours of elementary work in fuels, lighting, cleaning, the care of the house, and the composition of a few simple foods. *Autumn and Spring Quarters.*

2. COOKERY. A continuation of Course 1.

Winter and Spring Quarters.

A. SEWING. Practice in hand sewing. Talks on materials used. Cutting and making of plain garments. Ten hours a week.

Autumn Quarter.

B, C. SEWING. Machine sewing. Cutting and fitting of plain dresses. Use of patterns. Basketry. Ten hours a week.

Winter and Spring Quarters.

4. HOUSEKEEPERS' COURSE IN COOKING. This course consists of practical work in the preparation of common dishes, with the study of the food principles and the effect of heat upon each. It is designed to meet the needs of housekeepers rather than of young students. Two periods a week of two hours each. *Every Quarter.*

5. HOUSEKEEPERS' COURSE IN COOKING. A continuation of Course 4. Instruction is given in the preparation of more elaborate dishes and in serving. Two periods a week of two hours each.

Winter and Spring Quarters.

6. DOMESTIC ECONOMY. Practical work in cooking four hours a week. Lectures on sanitation three hours a week.

Autumn Quarter.

7. DOMESTIC ECONOMY. This course continues the practical work

of Course 6, with lectures on fuels, lighting, cleaning, and laundry work. *Winter Quarter.*

8. DOMESTIC ECONOMY. Work in large recipes. A chafing dish course. Invalid cookery. A study of the composition of foods and dietary work. *Spring Quarter.*

Courses 6, 7, and 8 are designed for those who are preparing to teach, and for others who wish instruction in advance of that given in preceding courses.

Free-Hand Drawing.

In the work laid out for free-hand drawing Course 1 is intended to be of general educational value, and a foundation for other work in drawing.

In 2, 3, and 4 students will have an opportunity to carry on the work in drawing with greater liberty in the choice of mediums. It is planned to have this work prepare the student for advanced work in the study of art in art schools.

1. FREE-HAND DRAWING. Drawing in charcoal from geometric solids, introducing fundamental principles of perspective, and light and shade. Charcoal from casts of features, hands, feet, heads, and historic ornament. One day in the week will be devoted to sketching in pencil and to a brief study of art history.

2. FREE-HAND DRAWING. Charcoal from casts. Studies from still life in pen and ink, and wash. Elementary designing.

3. FREE-HAND DRAWING. Water color, pen and ink, wash from still life. Advanced charcoal work.

4. COLORING AND MODELING. Oil or water color, pen, wash, clay modeling, and charcoal.

Library Economy.

The courses in library economy outlined below are offered with a view to the interests of two classes of students: (*a*) collegiate students who wish to elect library economy; (*b*) special students who have completed two or more years of collegiate training and wish to begin preparation for library work. Cutter's Rules for a dictionary catalog, Dana's library primer, and Dewey's simplified library school rules are used as text-books. There is also required from the student much topical reading in the files of the library periodicals and reference handbooks on library economy. Careful attention is paid to the systematic keeping of orderly note-books. In addition to the regular preparation for the class room, each student spends at least two hours daily in laboratory work in the library, thus becoming familiar with the practical routine. The class has the advantage of frequent talks from visiting librarians on various phases of library work, and lectures by professors

in the Institute on the literature and bibliography of their several departments. During the winter and spring quarters, excursions are made to the large libraries of the city and suburbs for a comparative study of methods.

1a. THE MECHANISM OF THE LIBRARY. The mechanical preparation of the book for the shelves will be dealt with: this includes the processes of collating, embossing, tagging, repairing, handwriting, etc.

An outline will be given of the machinery of the order system, the loan desk, the handling of gifts and exchanges. *Autumn Quarter.*

1b. THE CATALOG. This is an elementary course in simple author cataloging; it includes also the filing of cards, the study of the accession catalog, and the cataloging and care of periodicals.

Autumn Quarter.

2a. THE REFERENCE ROOM. Instruction will be given in methods of making the resources of the library available to readers by an intelligent use of indexes, encyclopedias, atlases, dictionaries, and reference hand-books. The leading trade bibliographies will be examined, also bibliographies of a few special subjects, such as periodicals, children's literature, etc. *Winter Quarter.*

2b. THE CATALOG. This is a more detailed study than is given in Course *1b* of the principles and technique of cataloging. Special attention is paid to the selection of subject headings for the dictionary catalog. The cataloging of continuations and society publications, and analytical work is undertaken. *Winter Quarter.*

3a. CLASSIFICATION. In this course the elementary principles of classification will be discussed, with the special aim of teaching the student flexibility and intelligence in the use of any selected system.

Practice will be given in classifying books according to various systems, with special emphasis on the Dewey decimal and Cutter expansive classifications. There will be work on different forms of the shelf-list and schemes of book-numbers. *Spring Quarter.*

3b. BOOKBINDING. This course consists of lectures and topical work on the essentials of good bookbinding, with practice in preparing books for the binder and examination of leathers and other stock materials. A brief outline sketch of book-making will be given. Visits to binderies will be made. *Spring Quarter.*

Physical Culture.

BOYS' DEPARTMENT.

The method of instruction pursued is not limited to any one system. Proper recognition is given to any method the whole or parts of which have been found useful, or which indicate efficacy. Consideration is given to hereditary tendencies, and to individuality, in physical possibilities, physical condition, and physical tastes. Individual training,

therefore, is encouraged in every case, and especially where an examination discloses a student's inability to pursue general or concerted exercises, either from threatened injury or inability to profit by such work.

Students, upon entering the Institute, are entitled, without cost, to a thorough physical examination. The examination includes accurate measurements of the physical proportions, a careful examination of the heart, lungs, and spine, and the strength of the principal groups of muscles; at the same time, information is solicited concerning heredity.

In every case where a defect is found in the boy's heart or lungs, he is advised to consult a physician, as the presence only, and not the degree of the defect, is determined. Upon the basis of the information so gathered instruction is given as to particular exercises and the use of various developing apparatus.

In addition to individual work, daily classes are given (commencing immediately after Thanksgiving Recess and continuing to the Easter Recess) in hygienic, educative, corrective, competitive, and recreative gymnastics, adapted as nearly as possible to the needs of individuals of all ages and physical conditions. The exercises so given are carefully graded as to progression, physiological effects, mechanical difficulty, and the boy's power of correct muscular co-ordination.

The boys' gymnasium contains a spacious exercise hall (100x62 feet), equipped with the most approved developing appliances, as well as apparatus for light and heavy gymnastics, hand-ball and basket-ball courts, shower and sponge baths, locker rooms and lockers, lavatories, visitors' gallery, and Instructor's office.

The gymnasium is open from 12 m. to 7 p. m., every school day. Attendance is voluntary and free of cost to all. Classes are arranged at such hours as not to conflict with other school duties.

ATHLETICS.

During the Autumn and Spring Quarters out-of-door athletic games and sports are practiced under the personal supervision of the Instructor in Physical Culture. Only such games and sports are encouraged as the location, character, and athletic equipment of the school make it desirable and possible to pursue.

Students are not permitted to compete on athletic teams without first passing a satisfactory physical examination.

PHYSICAL CULTURE FOR GIRLS.

The Swedish system of gymnastics will form the basis for the year's work. This system is scientific, progressive, and rational, and its methods are safe and effective. The movements are cumulative, producing related effects, which manifest themselves in a better physique and in a better basis for higher moral and intellectual life.

The first half of the year's work will consist of free-floor exercises (without apparatus), fancy marching and drills, competitive and recreative games.

The second half will consist of advanced floor work, together with apparatus work on the Swedish boom, wall-bars and stools, walking-beams, rope, horizontal and serpentine ladders.

Physical examinations will be given and prescription cards for diet and exercise will be issued according to individual needs.

The work is educative, hygienic, and recreative. It cultivates an erect carriage, corrects spinal curvature and faulty habits of standing, sitting, walking, improves the circulation and respiration, gives strength and self-control, secures mental relaxation, and proportional body development.

Brief talks on "First Aid to Injured," and Hygiene, with its attendant subjects, will be given during the year.

Evening Classes.

The session of 1902-03 opens October 6, and is divided into three terms of ten weeks each. The Institute is open four evenings a week. Some of the courses of instruction are given on Monday and Thursday evenings, others on Tuesday and Friday evenings. The courses are so arranged as to make it possible for a student to take one course and attend two evenings a week, or two courses and attend four evenings a week. The cost of tuition for one course of instruction, two evenings a week, for a term of ten weeks is five dollars; for two courses of instruction, four evenings a week, ten dollars.

Any course of instruction offered day students will be repeated at night if the demand is such as to justify the formation of a class. Provision has also been made for such instruction as will enable young men and women who are employed during the entire day to continue their education along those lines that will be of the most service to them in the work in which they are engaged.

The following Courses of Instruction were given during the session of 1901-1902:

EVENING COURSES OF INSTRUCTION.

DIVISION I. Mechanical Drawing, Machine Sketching, Machine Design, Machine Shop Practice, Forge Practice and Tempering, Foundry and Cupola Practice, Engineering Principles and Practical Mathematics, Laboratory Testing, Mechanical and Electrical Engineering Laboratory, Alternating Current Machinery, Power Plant Equipment and Calculations, Architectural Sculpture, Structural Steel Work, Chemistry.

Attendance, 507.

DIVISION II. English Literature, English Composition, Latin, German, French, Spanish, Algebra, Geometry, Trigonometry.

Attendance, 151.

DIVISION III. Arithmetic, English Grammar, Reading, Spelling, Composition, Penmanship, Accounting. *Attendance, 201.*

DIVISION IV. Cooking, Physical Culture, Photography, Home Nursing and Emergencies. *Attendance, 228.*

Summer Session.

The session of 1902 opens July 7 and continues until August 15. The courses are so arranged as to make it possible for a student to complete one or two courses of instruction in six weeks. The cost of instruction for one course is five dollars; for two courses, ten dollars. Any course of instruction offered by the Institute will be repeated in the summer session if the demand is such as to justify the formation of a class. Special provision is also made for those who are preparing for admission to the Institute.

Following were the courses for the session of 1901:

SUMMER COURSES OF INSTRUCTION.

English Literature and Composition, History, Shopwork in Wood and Iron, Mechanical Drawing, Algebra, Geometry Trigonometry, Physics, Chemistry, Latin, Greek, German, French, Domestic Economy, Elementary English, Arithmetic, and Geography.

Attendance for 1901, 181.

Summary of Attendance.

Year Ending in June.....	1897	1898	1899	1900	1901	1902
Students in Day Classes.....	434	545	643	790	1,006	1,033
Students in Evening Classes..	260	520	775	1,190	1,029	1,087
Total, Day and Evening..	694	1,065	1,418	1,980	2,035	2,120

Fifth Annual Commencement.

June 19, 1902.

Degree Conferred.

Mechanical Engineer.

CHARLES ROBERT BIRDSEY

Titles Conferred.

Associate in Science.

SAMPSON ABRAHAMS
GEORGE DAVID BIRKHOFF
MARGARET JOHNSTON DUNCAN
ETHELYN HELENA DUX
HELEN LOUISE FINNEY
LOUISE ANTOINETTE GASTMAN
JOSEPH EDWARD HORA
FRANCIS HOWARD LANE
JESSIE ELIZABETH MEADE
FRANK CHARLES MENCL
HAROLD HUDSON MORGAN
FREDERICK PAIGE PRITCHARD
NORMAN MELDRUM ROBERTSON
SAMUEL JOHN SAMELOW
MARY MOULTON SMITH
CLARA MAY WOODLEY

Associate in Literature.

ETHEL PERCY ANDRUS
CHARLOTTE INGABOR BENDIX
GRACE DARLING BISSELL
GERTRUDE LEIGH CASWELL
FLORENCE MARY COTTON
DANA EVERLEY
HENRY ORLANDO ERWIN
FLORENCE HILL
AGNESS JOSLYN KAUFMAN
ISABEL LENNA KILNER
LEWIS SCOFIELD MINER
ELIZABETH A. RAY
RAYNA SIMONS
TINA MOZELLE SKEER
JOHN HENRY SMALE
HELEN AMELIA SULLIVAN
RHODA WHEELER
KATHERINE LOUISE WYMAN

List of Students.

The names of students taking special, evening, or summer courses are not included in the following lists.

Collegiate Division.

1. SCHOOL OF ENGINEERING.

Abrahams, Sampson
Bailey, Alexander D.
Birdsey, C. Robert
Birkhoff, George D.
Davis, Maurice
Day, Letcher V.
Douglas, Lee H.
Fonda, Charles J.
Foskett, Roy M.
Hatch, Samuel R.
Havens, Fred L.
Henning, Charles F.
Hill, Francis H.
Hill, Roy W.
Hof, William G.
Hoit, Walter B.
Jensen, J. Norman
Juhnke, Paul
Klima, Julius
Lane, Howard
Mabb, Percy L.
Meier, Ernest
Merrill, Frank W.
Michael, Maurice
Morgan, Harold H.
O'Byrne, Leo
Page, Orville L.
Peebles, James
Robbins, Harold W.
Ray, Hugh L.
Russell, David A.
Shively, Thomas C.
Singer, David
Sparr, Arthur H.
Tolsted, Elmer
Walker, Clifton J.
Walsh, Charles
Wheaton, Harry M.

2. SCHOOL OF SCIENCE AND LITERATURE.

Adams, Florence
Andrus, Ethel P.
Angle, Luthera
Bachelle, Percy
Badenoch, Annie
Banks, Harry P.
Barnard, Lela E.
Beckerleg, Lillian E.
Beckwith, Ruth G.
Beezley, Charles F. Jr.
Bendix, Charlotte I.
Bissell, Grace D.
Bissell, Zella S.
Boughton, Thomas H.
Brown, James
Bruner, Louise
Butler, Jessie E.
Cady, Gilbert H.
Cassell, George F.
Chamberlain, Elizabeth

Chamberlain, May A.
Chapman, George
Clark, Zoura
Collins, Mildred I.
Cotton, Florence M.
Cotton, Martha A.
Cottrell, Louise
Cox, Emily B.
Craven, Edward
Dicker, Nellie E.
Drott, Raphael S.
Duncan, Margaret
Dux, Ethelyn
Erwin, Henry O.
Everley, Dana
Field, Bertha L.
Findlay, Mayme B.
Finney, Helen L.
Fish, V. Janet
Forbes, Mabel F.
Gannon, Edward
Gastman, Louise A.
George, Harry W.
Gillespie, Jessie A.
Goerg, Bertha B.
Grafius, Marjorie
Greene, Myrtle A.
Hall, Edith
Hazelwood, Craig B.
Heap, Jane
Hegner, Robert W.
Herrinton, Minerva
Hill, Florence
Hill, Irene E.
Hitchcock, Louise
Hora, Joseph
Jacob, Herman F.
Kaufman, Agness
Keener, Alice E.
Kerr, Joseph Y.
Kilner, Isabel L.
Kohlsaat, Cora J.
Kron, Harry J.
Linker, Myer
Mamer, Clio
McClure, Clyde H.
McLeod, Mabel
Mead, Lewis F.
Meade, Jessie E.
Mencl, Frank C.
Merritt, Robert F.
Miller, Agnes
Miner, Lewis S.
Mojonnier, Lydia
Morcomb, Margaret
Nourse, Edwin G.
Owen, Lettice W.
Parker, Geraldine
Perley, Catharine L.
Polachek, Charles H.
Pritchard, Frederick P.
Pusey, William C.
Randall, Grace O.
Ray, Bessie
Raymond, Agnes
Reid, Susan M.
Rhodes, Clara G.
Roadifer, Ada
Robertson, Norman
Rose, Edith P.
Salisbury, Robert H.
Samelow, Samuel J.
Schaefer, Doris
Shepard, Anna L.
Simons, Rayna
Skeer, Tina M.
Smale, John H.
Smith, Imogene
Smith, Mary M.
Smyth, Agnes A.
Sneed, Benjamin F.
Spoehr, Conrad
Stenn, Harry
Stephens, Alda M.
Street, Florence
Strong, Walter A.
Suddard, Edna
Talcott, Frances

Thayer, Belle R.
Thompson, Alice S.
Thoms, Edith M.
Touzalin, Chester
Van Meter, Florence B.
Welch, Susie E.
Wescott, Orville D.
Westover, Frances L.
Wheeler, Rhoda
Williams, Howard J.
Woodley, Clara M.
Wyman, Kathryn
Young, Ethel B.

Academic Division.

Ahles, Irene
Aldridge, Mabel
Amacker, Anna
Amberg, Florence
Anderson, Willa
Arnold, Sarah K.
Aylward, Emma
Baird, Frederic R.
Baird, Harriet S.
Baker, Elizabeth
Banning, Ephraim
Barnett, Harry
Bartlett, Royal F.
Barton, Jesse B. Jr.
Baskerfield, Harry
Bassett, Morton A.
Beeson, B. Barker
Benham, Jessie S.
Bennett, Arthur N.
Benson, Walter L.
Binford, Tod
Birkhoff, Louise M.
Borg, Charles
Bristol, George H.
Brophy, William C.
Brown, Ethel
Buechner, William A.
Bullard, Harry
Burggraf, Julia
Calhoun, Douglas
Carden, William H.
Carter, Allan J.
Catlin, Marcus J.
Chadwick, Ruth
Clark, Jane S.
Clenny, Russell H.
Coit, Roger
Conn, Warren S.
Courtwright, Milton
Coveney, Mabel
Crighton, Charles H.
Curtis, Leonard D.
Deakin, Earl
De Costa, Rayna
Deutsch, Simon
Dewar, John
Dickey, Dwight C.
Dieter, Charles
Doyle, Francis
Doyle, James J.
Doyle, Robert
Dunn, Elizabeth
Dupee, Charles E.
Durgin, William R.
Egan, Buford
Ellis, Eldora
Ellis, Gertrude H.
Evernden, W. Blaine
Ewing, Theodore A.
Fischer, Alfred H. H.
Fischer, Alonzo
Fischer, Edmund
Fithian, Davenport
Fitzsimmons, James A.
Flanders, Edward A.
Franklin, Gustave
Fraser, Violet
Frederickson, Frederick O.

Friedlander, Amy
Friedman, Dora
Friestedt, Arthur
Furst, William H.
Galbraith, John
Ganschow, Lina E.
Gantzer, Grace
Giddings, Edward R.
Gill, Louise
Goehring, Frank
Grimm, Otto
Hall, Eugene C.
Hall, Mildred L.
Hamilton, Arthur
Hanson, Louis J.
Hanssen, Fred
Harrison, Veva C.
Heinz, Alice M.
Herr, Thornton A.
Herrington, George
Hertz, Harriet M.
Holmes, Harold
Hunter, Vincent
Hunter, Mabel
Huszagh, Harold D.
Ivison, George E.
Izard, Forrest
Jardine, Frederick B.
Jenesen, George R.
Jenks, Katherine L.
Johnson, Olof B.
Jones, W. Bradford
Jorgeson, Charles M.
Joy, Fred C.
Kelly, Hazel D.
Kenison, Samuel J.
Kibbey, Warra
Kitch, Pearl
Kolkow, Charles R.
Koltinsky, Irvin S.
Krueger, William E.
Kurz, Christian A.
Lane, Harriet A.
Lemon, Harry B.
Lester, May L.
Loomis, Charlotte
Lueders, August H.
Main, Julia
Martin, Charles P.
Martin, Edward D.
Martin, Mary E.
Maynard, Henry S.
McCasky, Grace
McChesney, Sherman
McKenney, Ella C.
McMillen, Clare
Mead, Lucy
Melcher, Austin G.
Merryman, Dudley
Meyer, Herman
Michel, Louise
Millard, Chancey S.
Millholland, Paul
Moore, Grace E.
Moore, Stewart L.
Moulton, Robert
Moyer, Adele L.
Murray, Louise
Musser, Martin E.
Needham, Mabel
Newhall, John
Niehoff, Walter E.
Nonnast, Harry W.
Parker, Harry.
Parsons, Eugene W.
Pease, Theodore
Peet, Ova E.
Pollard, Maud E.
Pridham, Edwin
Quinn, Cecilia
Reed, Ralph
Reffke, Otto F. H.
Riffel, Bernhard
Ring, Mary E.
Ritchie, Prescott C.
Roach, Rudolph C.
Roberts, Jean
Roeschlaub, Marguerite

Rollo, William E.
Ryan, Mary A.
Sailor, Horace P.
Sater, Adella
Schaefer, Fred P.
Scharle, Louis
Shink, Joseph
Scott, Donald
Scott, Robert D.
Shepard, Holmes A.
Shewman, Mattie
Smerling, Elsie A.
Smith, Delbert C.
Smith, Harry H.
Smyth, John U.
Spear, Clara L.
Sperry, David R.
Spoehr, Herman
Stafford, Richard W.
Stauffer, Harry L.
Strawbridge, Mabel
Street, Robert K.
Strong, Ralph S.
Sullivan, Boetius
Thompson, Jennie
Thompson, Mary
Tower, Rosamond M.
True, Lawrence
Tuthill, R. Stanley
Underhill, Lee
Wahl, Orlin I.
Walter, Charles A.
Warren, Paul C.
Warren, Robert S.
Weaver, Harold P.
Wegeforth, Charles P.
Wells, Warren
West, William B.
White, Lelia C.
Wieboldt, Raymond C.
Wieboldt, Werner A.
Wilder, Edward G.
Wilder, Harold
Wilder, Marjorie
Williams, Edward P.
Wolcott, Frank E.
Woodcock, Grace L.
Woods, Bert L. T.
Zerwekh, George

Preparatory Division.

Albee, Charles M.
Alder, William F.
Allen, Harry B.
Allen, Ruth E.
Allen, Thomas D.
Alschlager, Walter
Amberg, Robert A.
Anderson, Albert
Anderson, Gustave
Anderson, Ray M.
Anneke, Marcel
Antonsen, Otto C. L.
Aronson, Samuel
Avery, Katharine L.
Babb, Horatio
Bain, L. Arthur
Baker, Flossie P.
Balis, Grant W.
Barnard, Glenn M.
Bartelme, Tonnie G.
Bartels, Louisa B.
Baskerfield, Lucy
Baum, Robert
Benedict, Frank
Benning, Henry
Benson, Burt L.
Bishop, Jessie E.
Bjurstrom, Herman F.
Blades, Pearl
Blahnik, Karel B.
Bliss, Gertrude L.
Blum, Stanley W.
Bock, Olive A.
Bodine, Carl

Bonnell, Frank T.
Booth, Arthur
Bossard, Arthur
Bowen, George H.
Bowlin, George E.
Bradford, Clarkson B.
Brannum, James H.
Brenton, Kennicott
Bronson, Fred B.
Buchanan, Helen D.
Bull, Chauncey
Bullard, Kenneth
Burlingame, Robert B.
Burnham, Dorothy
Bushing, William C.
Cadle, William L.
Cady, Ruth
Calbick, Chester A.
Campbell, Margaret G.
Carlson, Carl E.
Carpenter, Frank G.
Carr, Elsa C.
Carroll, Una M.
Carter, William A.
Cartter, Horace
Case, Fannie S.
Chadwick, Harold H.
Chamberlain, James
Chandler, Frances R.
Chapman, Paul P.
Charest, Ludger
Chiville, Gerald D.
Cuicci, Florence
Clark, Earl P.
Clark, James R.
Clarke, Robert E.
Cleveland, Carleton
Cleophas, Cornelia B.
Coates, Gertrude E.
Comstock, Stanford E.
Conway, James
Copeland, D. Belle
Cotter, W. Earle
Courtwright, Holmes
Covitz, Adolph
Crawford, William E.
Cullis, John R.
Curry, Clifford
Cutler, Sam C.
Dahl, Harold L.
Dahl, Louis A.
Darnall, C. Allen
Dashiell, Juliet
Davidson, Albert J.
De Camp, Grace F.
Denniston, Brackett B.
Denton, Norman L.
Dieckman, Albert
Diehl, William
Diven, Carlyle
Downey, Joseph
Doyle, Horace F.
Drew, Marie J.
Dubs, Alford W.
Duncombe, Sadie E.
Dyrenforth, Donald
Dyrenforth, Ernest
Ebersol, Raymond G.
Ebner, Alfred
Eggert, George F.
Eiszner, Adeline C.
Eiszner, Bessie J.
Elsner, Edith F.
Engelhardt, Gustav
Ettelson, Anna D.
Everley, Leslie
Evertsen, Christian
Falls, Frederick H.
Farrar, Harlan T.
Faust, Clifford
Faust, George R.
Findeisen, Florence
Firstman, Jacob
Fish, Zayda B.
Fisher, Harry B.
Fitzer, Arthur
Fitzpatrick, Arthur
Flanders, Harvey H.

Flanders, Junius A.
Fluegge, Robert H.
Foley, Susie L.
Forbes, James S.
Forbes, Walter
Forster, Harry G.
Fox, Alfred C.
Fox, Emily M.
Frake, Emily
Frank, William
Fraser, Marjorie
Friend, Bertha L.
Fritts, Louise
Fritts, William W.
Galbraith, Alonzo
Geddes, Alfred
Gehrke, Alfred
Giffert, Lillian
Goodell, Charles H.
Gourley, John H.
Grace, John G.
Graham, Frank
Graham, Ralph
Grant, Charles B.
Gray, Carolyn
Gregg, Harold E.
Gregory, Willis L.
Griffin, Joseph T.
Griffin, Marybelle
Grimsell, Henry R.
Groebner, Carrie
Gruendel, George
Gyllenhaal, Alvin
Gyllenhaal, Vida
Haarvig, Effie M.
Haines, C. Grace
Hale, Ralph S.
Hall, Norman P.
Halloran, George
Halls, Allen S.
Hammerschmidt, Adolph
Hammon, Milton
Hammon, Eva P.
Hancock, Edwin Jr.
Hansen, Oscar
Happel, Fred C.
Harris, E. Preble
Harvey, James M.
Harzfeld, Jay S.
Haskell, John P.
Haskins, George E.
Haugaard, Albert B.
Haugan, Richard
Hayes, Francis
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Homoky, Charles A.
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Howe, Marjorie
Hughes, Harry M.
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Kedzie, Stuart
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Kenning, Carl R.
Kerr, Samuel, Jr.
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King, George R.
Kingman, Jusdon
Kistenbroker, Arthur W.
Klechak, Paul
Klehm, Herbert I.
Klein, Louis J.
Klocker, Carl J.
Klotz, Edward C.
Knox, Marion
Knudson, Peter
Kob, Charles
Kolb, John J.
Kopf, Melrose G.
Krauss, Leon
Kreer, George
Kreis, Harry J.
Kressman, Fred H.
Kreuter, Julia K.
Kreuter, Verner C.
Krueger, Arthur
Lamb, Vernon W.
L'Amoreax, Paul L.
Larson, Lillian C.
Latta, Smith
Lattimer, Rowena M.
Le Master, Elsie V.
Leonard, Gertrude G.
Leslie, Arthur L.
Levey, Clarence
Libbey, Thomas H.
Lindelsee, William
Lindsay, George M.
Lloyd, Clara I.
Lohner, Aaste
Lorimer, Leonard
Lorimer, William
Lounsbury, Bruce
Lueder, Walter
Luken, Martin
Lundstrom, Charles
MaConomy, Edward N.
Macqueen, Raymond
Maguire, William
Main, Elsie F.
Manning, Clarence E.
Marshall, Clara
Marshall, Franklin D.
Martin, Edward P.
Martin, Orin V.
Mason, Emma J.
Mason, Ralph H.
Masters, Sidney E.
Maulsby, Carrie
May, Rexford L.
Mayizma, Jensuke
Maynard, Helen
McClevey, Robert A.
McCorkle, Claire L.
McCoy, Bessie C.
McCracken, Harry H.
McCrea, Bessie
McCutcheon, Robert
McGann, Edward
McGrew, Clarence
McLaughlin, George
McLeod, William J.
McMahon, Agnes E.
Meacham, Lolo
Meacham, William
Meader, Roy C.
Medbury, Howard D.
Mellen, George
Menke, Emma
Meyer, Julia
Miller, Charles F.
Miller, Grace E.
Millholland, William

Moore, Ralph
Morgan, Edward J.
Morley, Bessie E.
Morley, Grace
Muench, George W.
Mullen, James B.
Mulock, Lester
Murdock, E. Paul
Nelles, J. E. Earle
Nelsen, Clarence L.
Nelson, Arthur B.
Nelson, George A.
Nicholl, William B.
Nichols, William H.
Niemann, Fred
Norris, Frederic L.
Noward, Bertha M.
O'Connor, James
O'Donnell, Fred
Oleson, George A.
Osbornson, Caroline E.
Osgood, Ralph B.
O'Shaughnessy, Isabel M.
Pack, Ferguson
Page, Orville
Page, Walter C.
Parrish, Ida E.
Patitz, George
Pattison, Florence
Patton, Leigh
Payson, Grace H.
Peacock, Luther
Peet, Dorma V.
Penner, Elsa
Perrill, Irving
Petersen, Hans
Pilat, George I.
Pillinger, Herbert
Pio, Herbert
Pirosh, George B.
Porter, Frank C.
Powers, Herbert
Pravdiza, Thomas
Price, Susie
Prinz, Rudolph
Prouty, Jennie M.
Rabe, Edwin O.
Rabe, Magdalene
Radmore, Eleda
Rae, Robert M.
Rankin, Rolland T.
Redborg, Enoch R.
Reed, C. Edward
Reeve, Yolandus H.
Reich, Max C.
Reiss, Joseph
Renwick, Ralph B.
Reuss, William O.
Reynolds, Silas
Riel, George
Riemer, Louis
Robbel, William G.
Robin, Luba
Robinson, Myra B.
Roehl, Ernest E.
Rollo, Thomas
Rom, Palmer W.
Ronning, Anna
Rothacker, Watterson R.
Russell, Franklin J.
Rutherford, David
Ryan, Kathryn I.
Ryan, Mabel E.
Salamon, Arthur D.
Sanborn, Harold C.
Sandell, Enoch
Savage, Howard
Sawyer, Willis F.
Schaal, Alvin
Schaub, William F.
Schiess, Roy E.
Schmidt, Royal J.
Schulenburg, August
Schuler, Walter
Schulze, Edward R.
Schuman, Frank
Schweiger, Edwin
Sennott, Sidney S.

Sheppard, Frank W.
Simington, Francis J.
Simon, Nettie
Skooglund, David
Smith, Alice
Smith, Beulah P.
Smith, Edward A.
Smith, Hobart
Snite, Fred B.
Soiberg, Arthur
Starke, Charles H.
Stein, L. Montefiore
Stielow, Fred
Stillians, Bessie
Stone, Porter E
Strode, Bruce
Sullivan, Mary C.
Sutton, Harry B.
Swanson, Carl
Swarts, Neva
Swissler, Edna P.
Swissler, William R.
Talbot, Anna E.
Tapp, Edward
Taylor, Mary
Taylor, Percy J.
Taylor, Roy C.
Thayer, Allyn K.
Thom, Arthur
Thompson, Merritt W.
Tierney, Edward
Todd, Eric D.
Towers, Walter K.
Towne, Stella A.
Treloar, Percy
Trout, Thomas W.
True, Davis
Troyer, Edgar
Utley, Paul
Utter, Richard I.
Walker, Chas. P.
Walker, Ralph
Walker, Robert G.
Wallace, Charles E.
Wallace, Clara
Wallis, Jennie
Warr, Harold G.
Wayman, James W.
Weihmann, Arthur
Weinert, Max
Wells, George H.
Wells, Harry
Wernicke, Harry
Westfall, Charles
White, Helen
Whittemore, Aubrey
Whittemore, William L.
Whitehead, Richard H.
Whiting, John T.
Whittick, Edith
Wickstrom, Albert M.
Wilder, George G.
Wiley, Robert P.
Williams, Meredith P.
Williams, Noble N.
Wincup, Thomas
Winkler, Alice V.
Winlack, James
Winslow, Hugh B.
Winter, Albert H.
Wolf, Robert N.
Wolf, William J.
Wolfenstetter, Ethel J.
Wolff, Henry J.
Woodcock, George
Yampolsky, Rebecca
Yers, Louise
Yous, Rush
Zahn, Charles J.
Zellweger, Fred
Ziska, Adam

LEWIS INSTITUTE

SEVENTH ANNUAL REGISTER

CHICAGO

1903

SEVENTH ANNUAL REGISTER

OF THE

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CORPORATION.

OFFICERS.

JOHN A. ROCHE,
President.

CHRISTIAN C. KOHLSAAT,
Vice-President.

JOHN McLAREN,
Secretary and Treasurer.

TRUSTEES.

OLIVER H. HORTON,
THOMAS KANE,
CHRISTIAN C. KOHLSAAT,
JOHN McLAREN,
JOHN A. ROCHE.

BOARD OF MANAGERS.

GEORGE N. CARMAN,
BERNARD A. ECKHART,
WILLIAM R. HARPER,
JAMES B. HERRICK,
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EDMUND J. JAMES,
THOMAS KANE,
CHRISTIAN C. KOHLSAAT,
ALBERT G. LANE,
JOHN McLAREN,
JOHN A. ROCHE.

BUSINESS AGENT, WILLIAM H. HALL.

Calendar 1903-1904.

July 6, Monday—Summer Session begins.

Aug. 14, Friday—Summer Session ends.

Sept. 7-11, Monday to Friday—Final Examinations for Admission.

Sept. 14, Monday—Autumn Quarter begins for students who have not heretofore been in attendance at the Institute. Recitations for one week as a basis for permanent classification.

Sept. 21, Monday—Autumn Quarter begins for students who were in regular attendance during the year 1902-1903.

Sept. 28-Oct. 2, Monday to Friday, Evenings—Registration and Classification of candidates for admission to Evening Classes.

Oct. 5, Monday—Evening Classes begin.

Nov. 26-27, Thursday and Friday—Thanksgiving Recess.

Dec. 18, Friday—Autumn Quarter ends.

Holiday Recess for two weeks.

Jan. 4, Monday—Winter Quarter begins.

Feb. 12, Friday—Lincoln's Birthday—Patriotic Exercises.

Feb. 22, Monday—Washington's Birthday—a Holiday.

March 25, Friday—Winter Quarter ends.

Quarterly Recess for one week.

April 4, Monday—Spring Quarter begins.

From May 21 to June 25—Preliminary Examinations for Admission. Saturdays from 9 A.M. to 1 P.M.

June 24, Friday—Spring Quarter ends.

FACULTY.

GEORGE NOBLE CARMAN, Director.

A. B., University of Michigan, 1881; Principal Ypsilanti (Mich.) High School, 1880-82; Superintendent of Schools, Union City, Mich., 1882-85; Principal Brooklyn (N. Y.) Grammar School No. 15, 1885-89; Principal St. Paul (Minn.) High School, 1889-93; Dean of the Academy of the University of Chicago, Morgan Park, Ill., 1893-95.

WILLIAM ALBERT GREESON, Professor of Mathematics, and Dean of the Faculty.

A. B. and A. M., University of Michigan, 1879; Principal Flint (Mich.) High School, 1879-81; Instructor in Grand Rapids (Mich.) High School, 1881-85; Principal of Grand Rapids (Mich.) High School, 1885-96.

EDWIN HERBERT LEWIS, Professor of English.

A. B., Alfred University, 1887; A. M., *ibid.*, 1887; Senior Teacher, Vice-Principal, Plainfield (N. J.) High School, 1887-88 and 1889-90; Student in Italian libraries, 1888-89; Professor of Latin, Alfred University, 1890-92; A. M. and Ph. D., Syracuse University, 1892; Fellow in English, University of Chicago, 1892-93; Assistant in Rhetoric, *ibid.*, 1892-94; Ph. D., University of Chicago, 1894: Instructor in Rhetoric, *ibid.*, 1894-96; Associate Professor, *ibid.*, 1896-99.

PAUL MELLEN CHAMBERLAIN, Professor of Mechanical Engineering, in charge of Machine Design and Engineering Laboratory.

B. S., Michigan Agricultural College, 1888; M. E., Cornell University, 1890; with Brown Hoisting and Conveying Machine Co. Cleveland, Ohio, 1889-90; Assistant Engineer with Frick Co., Waynesboro, Pa., 1890-92; Mechanical Engineer for Hercules Iron Works, 1892-93; Assistant Professor Mechanical Engineering, Michigan Agricultural College, 1893-96; Assistant Professor of Mechanical Engineering, Lewis Institute, 1896-99.

CHARLES WESLEY MANN, Professor of History.

A. B., De Pauw University, 1887; A M., *ibid.*, 1888; Instructor in Mathematics and French, De Vaux College, N. Y., 1887-88; Instructor in Mathematics, and Superintendent, Kenyon Military Academy, Gambier, Ohio, 1888-91; Associate Principal, Illinois Military Academy, Morgan Park, 1891-92; Dean of Chicago Academy, 1893-96; Assistant Professor of History, Lewis Institute, 1896-1900.

PHILIP BELL WOODWORTH, Professor of Physics and Electrical Engineering.

B. S., Michigan Agricultural College, 1886; M. E. in Electrical Engineering, Cornell University, 1890; with Brush Electric Co., Cleveland, Ohio, 1889-90; Student in University of Berlin, 1891-92; Assistant Professor in charge of Physics and Electrical Engineering, Michigan Agricultural College, 1892-99; Assistant Professor of Physics and Electrical Engineering, Lewis Institute, 1889-91.

CLARENCE ELBERT DEPUY, Assistant Professor of Mechanical Engineering, in charge of Shop Practice and Machine Construction.

B. S. in Mechanical Engineering, University of Michigan, 1891; in Machine Shop of Dennis Machine Co., Jackson, Mich., 1883-87; Instructor in Machine Shop, Chicago Manual Training Schoo , 1891-96.

HERBERT EDGAR COBB, Assistant Professor of Mathematics.

A. B., Wesleyan University, 1887; A. M., *ibid.*, 1890; Instructor in Mathematics, Maine Wesleyan Seminary and Female College, 1887-90; Instructor in Mathematics, University of Colorado, 1890-92; Graduate Student in Mathematics and Lecturer in University Extension Division, University of Chicago, 1892-96; Instructor in Mathematics, Lewis Institute, 1896-99.

MILO GRANT DERHAM, Assistant Professor of Greek and Latin.

A. B., Cornell University, 1892; Instructor in Greek and Latin, Dayton Academy, Dayton, Ohio, 1892-93; Instructor in Latin, Academy of Northwestern University, 1893-94; Instructor in Greek and Latin, Chicago Academy, 1894-96; Instructor in Greek, Lewis Institute, 1896-99.

ALEXANDER WILLETT MOSELEY, Assistant Professor of Applied Mechanics.

S. B., Massachusetts Institute of Technology, 1891; Draftsman, World's Columbian Exposition, Chicago, 1891-93; with Webster Mfg. Co., Chicago 1894-95; Chief Draftsman Atlanta Exposition, summer 1895; Instructor in Mechanical Engineering, Massachusetts Institute of Technology, 1895-99; with Wm. Sellers & Co., Philadelphia, 1899; Assistant Professor of Mechanical Engineering, Michigan Agricultural College, 1900.

WARREN RUFUS SMITH, Assistant Professor of Chemistry.

A. B., Bowdoin College, 1890; Ph. D., University of Chicago, 1894; Instructor in Science, Leicester Academy, Leicester, Mass., 1890-91; Scholar in Chemistry, Clark University, 1891-92; Fellow in Chemistry, University of Chicago, 1892-94; Assistant in Chemistry, Bowdoin College, 1894-95; Instructor in Science, New Bedford High School, New Bedford, Mass., 1895-96; Instructor in Chemistry, Lewis Institute, 1896-1900.

JAMES WALTER FERTIG, Assistant Professor of History.

A. B., University of Nashville, 1890; A. M., *ibid.*, 1891; Graduate Student in History, Vanderbilt University, 1891-92; Instructor in History and Mathematics, Montgomery Bell Academy, Nashville, 1891-93; Graduate Student in History and Political Science, University of Chicago, 1893-97; Fellow in History, *ibid.*, 1894-97; Lecturer in the Extension Department, *ibid.*, 1895-96; Ph. D., *ibid.*, 1897; Professor of History, University of Arkansas, 1898-99; Instructor in History, Lewis Institute, 1899-1902.

JOSEPH RALEIGH NELSON, Assistant Professor of Latin.

A. B., University of Michigan, 1894; Instructor in Latin in John Marshall High School, Chicago, 1894-1900; Instructor in Latin, Lewis Institute, 1900-02; Graduate Student in Latin, University of Michigan, 1902-03; A. M., University of Michigan, 1903.

FRED A. ROGERS, Assistant Professor of Physics and Electrical Engineering.

B. S., in Electrical Engineering, University of Michigan, 1894; Electrical Engineer for Vermillion Milling and Electric Co., Vermillion, S. D., 1895-96; Assistant in Physics, Lewis Institute, 1896-97; Instructor in Physics and Electrical Engineering, *ibid.*, 1897-1902.

JESSIE LOUISE JONES, Assistant Professor of German.

A. B., Doane College, 1884; Graduate Student University of Michigan, 1894-95; Student in Berlin and Paris, 1888-90; Teacher in Jacksonville Female Academy, 1890-93; Teacher of German, Chicago Preparatory School, 1893-94; Teacher of German, Chicago Female College, 1894-95; Fellow, University of Chicago, 1895-96; Ph. D., *ibid.*, 1897.

GEORGE LEE TENNEY, Assistant Professor of Latin.

A. B., Denver University, 1894; Principal High School, Manitou, Colo., 1894-96; Instructor in Latin, Denver Manual Training High School, 1896-99; Graduate Student in Latin, University of Chicago, 1899-1900; A. M., University of Denver, 1900; Instructor in Latin, Denver Manual Training High School, 1900-1902; Instructor in Latin, Lewis Institute, 1902-03.

LEA RACHEL DELAGNEAU, Instructor in French.
Instructor in French, Chautauqua, N. Y., 1887-92; Instructor in French, Morgan Park Academy, 1893-95; Instructor in French and History in High School, Ottawa, Ill., 1888-96.

LOUIS EDWARD POPE, Instructor in Mathematics.
Accountant for Bayfield Brownstone Co. and R. D. Pike, Wholesale Lumber, Bayfield, Wis., 1886-91; Instructor in Arithmetic and Bookkeeping in High School, St. Paul, Minn., 1891-96.

CHARLES EMERSON PEET, Instructor in Physiography.
B. S., University of Wisconsin, 1892; Fellow in Geology, University of Chicago, 1892-95; Assistant New Jersey Geological Survey, 1891-95; Assistant U. S. Geological Survey, 1895-97; Instructor in Geology and Physical Geography, Englewood High School, 1897-99.

HELEN DOUGAL STREET, Instructor in Latin.
A. B., University of Wisconsin, 1876; A. M., *ibid.*, 1879; Instructor in High School, Madison, Wis., 1877-81; Instructor in Latin, University of Wisconsin, 1883-84.

PHILEMON BULKLEY KOHLSAAT, Instructor in English.
Ph. B., University of Chicago, 1894; Teacher in Chicago Heights High School, 1894-95; Instructor in Latin, Chicago Academy, 1895-96; Fellow in English, University of Chicago, 1897-99.

GEORGE ALEXANDER ROSS, Instructor in Woodwork.
Instructor in Woodwork, Chicago Manual Training School, 1890-93; Instructor in Woodwork, Jewish Training School, Chicago, 1893-98.

STEPHEN EMERY, Instructor in Mathematics.
A. B., Boston University, 1890; Instructor in Medford, Mass., High School, 1890-92; Principal of Academy, Yankton, South Dakota, 1892; Instructor in Mathematics, Harvard School, Chicago, 1893-94.

CHARLES EDGAR HOYT, Instructor in Foundry Work.
Instructor in Foundry Work and Pattern Making, Michigan Agricultural College, 1894-98; with Walker Manufacturing Company, Cleveland, Ohio, summer of 1897.

EDWARD BURTON DEGROOT, Instructor in Physical Culture.
Physical Director, Montclair Military Academy, 1891-97; Special Instructor, Harvard University Summer School of Physical Training, 1897; Student, Medical College of Virginia, 1897-98.

MARIE ELSA BLANKE, Instructor in Freehand Drawing.
Graduate of the Art Institute, Chicago.

JOHN LORD BACON, Instructor in Forge Work.
Graduate of Chicago Manual Training School, 1896; with Illinois Steel Co., 1896; with Marine Iron Works, 1896-98.

JULIA DUMKE PEET, Instructor in German.
Ph. B., University of Chicago, 1898; Student at University of Berlin, 1897-98; Assistant Principal in High School, Belle Plaine, Iowa, 1891-93.

ARCHIBALD WHITTIER SMALLEY, Instructor in Latin.
A. B., University of Michigan, 1898; Instructor in Adrian (Mich.) High School, 1898-99.

WILLIAM EUGENE MOFFATT, Instructor in Latin.
A. B., University of Chicago, 1896; Graduate Student, *ibid.*, 1896-97, 1901; Instructor in Latin, South Side Academy, Chicago, 1897; Assistant in Latin and Greek, Bradley Polytechnic Institute, 1897-1901; Assistant in Greek, University of Chicago, summer 1900.

DIC HECTOR TROWBRIGE, Instructor in Chemistry.
B. S., University of Michigan, 1898; Instructor in Adrian (Mich.) High School, 1898-99; Assistant in Chemistry, University of Michigan, summers, 1899-1900.

CHARLES SCHENCK, Jr., Instructor in Mechanical Drawing.
Student at University of Illinois, 1896-98: Draftsman with Troy Laundry Machinery Co., 1898-99; with W. S. McKinney, Mechanical Engineer, 1899; with Chicago Union Traction Co., Engineering Department, 1899-1901; with Purdy & Henderson, Civil Engineers, 1901.

LEWIS GUSTAFSON, Instructor in English.
A. B., University of Chicago, 1900; Assistant in English, Lewis Institute, 1897-1900.

EDWARD HERMAN LAY, Instructor in Mathematics.
A. B., Yale University 1894; Instructor in Mathematics, West Jersey Academy, 1895-96; New York Military Academy, 1896-97; Buckley High School, 1897-98; Graduate Student, University of Chicago, 1898-99; Principal Buchanan College, Troy, Mo., 1899-1900.

FRANK BERTRAM WADE, Instructor in Chemistry.
S. B., Wesleyan University, 1901; Assistant in Science, New Bedford High School, 1894-97.

KATE HEINTZ WATSON, Instructor in Domestic Economy.
Teacher in Public Schools, Princeton, Ill.; Graduate of Armour Institute of Technology in Department of Domestic Arts.

ANNA FORSTER, Instructor in French.
Graduate of Royal Seminary, Breslau, Germany, 1872; Instructor in German and French, Hillside School, Wisconsin, 1896-98.

WILLIAM PARKER HAWLEY, Instructor in Mechanical Drawing.
B. S., Michigan Agricultural College, 1892; Student, Cornell University, summer, 1899; Machinist with Troy Laundry Machinery Co., 1895-96; Draftsman with Coe Typesetting Machine Co., 1896-98; Teacher of Manual Training, Chicago Public Schools, 1898-1901; Draftsman, Ordnance Office, Washington, D. C., 1901.

JOHN DERK NIES, Instructor in Physics and Electrical Engineering.
B. S., Michigan Agricultural College, 1894; with Municipal Lighting Plant, Holland, Mich., 1894-1901; Student, Cornell University, 1900.

ROBERT HENRY TAFT, Instructor in Machine Shop.
Graduate of English High and Manual Training School, Chicago, 1894; with Miehle Printing Press Mfg. Co., 1894-1901.

IRENE STODDARD BAKER, Instructor in English.
A. B., University of Michigan, 1900; Assistant in English, Lewis Institute, 1901-02.

MARY MOULTON SMITH, Instructor in Domestic Economy.
Graduate of Gannett Institute, Boston, 1888; Associate in Science, Lewis Institute, 1902.

SARA ANNA JANSON, Instructor in Biology.
Graduate of Mankato (Minn.) State Normal School, 1892; Assistant Principal of High Schools, Little Falls and Brainard, Minn., 1892-97; B. S., University of Chicago, 1900; Instructor in Minn. State Teachers' Training School, summer, 1901-02; M. D., Rush Medical College, 1903.

JESSE MYRON OWEN, Instructor in English.
Ph. B., Iowa College, 1900; Instructor in English, French, and German in Ashland (Ky.) High School, 1900-01; Instructor in English and History in Drury College Academy, 1901-02.

FRANK VAN VLIET, Instructor in Mathematics.
A. B., University of Michigan, 1902.

KATE BELLE MILLER, Instructor in English.
Ph. B., University of Chicago, 1902.

TINA MOZELLE SKEER, Librarian.
Associate in Literature, Lewis Institute, 1902

Other Officers and Assistants.

LILLIE F. ABBOTT, A. B., Latin.
ETHEL P. ANDRUS, English.
ALEXANDER D. BAILEY, Mechanical Drawing.
NELLIE G. BARNARD, Sewing.
WILLIAM H. BATES, A. B., Mathematics.
CHARLES F. BEEZLEY, English.
GRACE D. BISSELL, English.
AGNES BROWN, Cookery.
R. P. BURKHALTER, English.
ELIZABETH BURTON, Physical Culture.
C. I. BUTTON, A. B., Mathematics.
FRANK W. CADY, A. B., English and Mathematics.
EDITH CAMERON, A. B., English and French.
ZOURA CLARK, English.
HARLEY R. COLVER, Ph. B., English.
FRED E. DAUNER, Accounting.
LETCHER V. DAY, Mechanical Drawing.
HENRY O. ERWIN, English.
HERMAN FISCHER, Penmanship.
V. JANET FISH, Domestic Economy.
HORACE S. FISKE, A. M., English Literature.
ANNIE W. GRABILL, Elocution.
JOHN GRZYBOWSKI, Mechanical Drawing.

J. N. HATCH, B. S., Structural Steel Work.
HERBERT W. HESS, English.
E. STUART HINTON, Architectural Sculpture.
CHARLES J. HORA, E. E., Modern Gas Practice.
CHARLES P. HULBURD, Mechanician and Curator.
JAY S. JACKSON, A. B., English.
WILLIAM J. KEARNEY, B. S., Engineer.
CORA J. KOHLSAAT, English.
MAY L. LESTER, Cookery.
CHARLES E. MANNING, M. E., Steam Engineering.
LYDIA MOJONNIER, Clerk.
EVA POPE, Accountant and Stenographer.
LENORE F. PRESTON, B. S., Physical Culture.
FRANK RICH, Mechanical Drawing.
HAROLD ROBBINS, Machine Sketching.
IDA SERVEN, Elocution.
ERNEST SICARD, French.
JOHN C. SOUTH, M. S., Mathematics.
DON FERNANDO STAUD Y XIMENES, M. E., Spanish.
ALDA M. STEPHENS, English.
GUSTAV SUNDBERG, Forge Work.
JOHN A. TUCK, Ph. B., Mathematics.
O. E. WEITHASSE, A. B., German.
MIRIAN H. WELCH, A. M., History.
H. W. WHEELER, B. S., Street Railway Practice.
OTTO WICHERSKI, English.

Organization and Equipment.

Historical Sketch.

The Lewis Institute owes its existence to the late Allen C. Lewis, who, by his will, which was admitted to record November 1, 1877, left a large part of his estate for the support of the Institute, and provided for its organization. Articles of incorporation for the Institute thus projected were granted by the Secretary of the State of Illinois, July 9, 1895.

James M. Adsit, Henry F. Lewis, and Hugh A. White were named in the will as the first trustees of the estate, the estimated value of which in 1877 was five hundred and fifty thousand dollars. Credit is due to these trustees, and especially to Hugh A. White, for such efficient management that the estate amounted, when turned over to the trustees of the Lewis Institute, November 21, 1895, to one million six hundred thousand dollars.

John A. Roche, Christian C. Kohlsaat, and John McLaren, under whom the Institute was incorporated, constituted the board of trustees from May 28, 1894, until the completion of the first buildings. The sites previously chosen having proved unsuitable, the trustees selected and purchased, at an expense of one hundred and sixty-nine thousand dollars, the principal portion of the block extending from Monroe street to Madison, between Winchester avenue and Robey street. This site is centrally located in the West Division of Chicago, and is easily accessible from all parts of the city by means of several lines of surface cars, and the Lake street and Metropolitan elevated roads.

Aim and Scope of the Work.

Taking into account the design of the founder, as expressed in his will, the experience of other institutions recently founded

with similar purposes and intentions, and the present educational needs of the city and locality, the management has determined to make the Institute "a thorough polytechnic school, and do all in their power to make it second to none in the thoroughness and efficiency of the teaching," with the understanding that such modifications and developments will be made in the future as the needs of the community suggest, and the resources of the Institute make possible.

Organization.

The Institute consists of a SCHOOL OF ARTS and a SCHOOL OF ENGINEERING.

The School of Arts comprises the instruction which is given in English, history, mathematics, physiography, physics, chemistry, biology, Latin, Greek, German, French, domestic economy, and freehand drawing. The courses reach from the beginning of the high-school period far into that ordinarily called collegiate.

The School of Engineering offers instruction in mechanical and electrical engineering to students who wish to become professional engineers. The courses of instruction in wood, pattern, foundry, forge, and machine shops, together with those in drawing, design, sketching, applied mathematics, electrical and mechanical engineering laboratories, are outlined under Engineering, pages 56 to 61. The aim is to present these subjects so that the student will become familiar with the underlying principles and acquire intelligence and skill in manipulation. Persons who intend to follow a trade allied to engineering may pursue such special courses as are recommended after consultation with the Director. The instruction given at night furnishes similar opportunities to those who are occupied during the day.

Tuition and Scholarships.

The Institute is provided with a liberal endowment, and is designed to help those who are willing to help themselves in securing such an education as will give them a more complete

mastery of modern life, with its increasing demands for skilled and intelligent service. To offer instruction free is believed to be consistent neither with the design of the Institute nor with that spirit of self-help and self-respect which is the basis of what is best in human character and achievement.

The uniform cost of instruction for full regular work is *twenty dollars a quarter of twelve weeks.* A reduction is made for a single course of instruction, and for evening courses.

Three scholarships have been established under the will of the late Mrs. Hugh A. White. Mr. John McLaren was named in the will to assign these scholarships.

Three additional scholarships are assigned by the Institute for excellence in public speaking.

The income derived from the endowment and tuition fees enables the Institute to secure the best talent and facilities for the accomplishment of its purpose, all receipts from tuition and other sources being used for the maintenance and advancement of the work.

The Buildings and Their Appointments.

The buildings, which were ready for occupancy at the opening of the Institute in September, 1896, cover a space extending one hundred and ninety-five feet on Madison street, by one hundred and twenty-five feet on Robey, and consist of the main building, which faces on both Madison and Robey streets, and a detached building, which is to be used hereafter as a gymnasium. The main building is six stories high above the basement. The first floor on Madison street is used for business purposes, in accordance with a provision of the will of the founder. A lecture hall, with a seating capacity of seven hundred and fifty, comprises the first and second floors on Robey street. The remainder of the main building is used for libraries, laboratories, lecture rooms, and class rooms. The gymnasium building is two stories high, with a basement, in which are the boiler and engine rooms.

The new engineering building is a six-story structure which connects with the south end of the main building on Robey

street and covers a space one hundred and twenty-two by sixty-six feet. It is divided into the north and south parts by the corridor, which is entered in the center of the building on Robey street. The south part of the building is devoted to shops and laboratories and the north part to drawing rooms and class rooms. The basement contains the forge shop and hydraulic laboratory. The first floor is used for offices, a laboratory for testing of materials, and a lecture room. The second floor is for class rooms and mechanical laboratory. The main connection with the present building is on the third floor, where there are libraries, class rooms, and a dynamo laboratory. The machine shops are located on the fourth floor and have class rooms adjoining. The fifth floor contaains the pattern shop and drawing rooms, and the sixth floor, the foundry and drawing rooms.

The buildings are fire-proof structures of brick, sandstone, and terra-cotta, with steel framework. They were erected at a cost of three hundred and fifty thousand dollars, exclusive of fittings and furnishings, and are designed to accommodate fifteen hundred students. Both the engineering and the main building are supplied with elevators and the most approved appliances for heating and ventilation, and are equipped with whatever apparatus is needed for the successful accomplishment of the work that has been undertaken.

The Library.

The library consists of ten thousand volumes, selected with immediate reference to the needs of each department. It is essentially a working library, containing all necessary reference works, together with representative books in the various sections of history, biography, literature, fine arts, engineering, mathematics, philology, and sociology. There are special libraries connected with the class rooms in physics and chemistry. During the past year there have been added to the library about one thousand volumes, including Murray's New English dictionary, the Statutes at Large from Magna Charta to George II., 1758, complete sets of the North American Review, and

The American Museum, and the Engineering Index, 1884-1900, by means of which the technical and scientific periodicals are now made available for reference. Five hundred and thirty-five volumes of periodicals have been bound and placed in the reading-room. One hundred and sixty-nine periodicals are currently received.

Throughout the school year the library is open from eight a. m. to five thirty p. m.; during the session of the night school, the hour for closing is nine thirty p. m. The students at all times have free access to the shelves. Library assistants serve in turn at the reference desk and assist in making the students familiar with the arrangement of the books and the use of the dictionary catalog. It has been attempted to make the catalog a clear, simple guide to the resources of the library and to keep it free from confusing technicalities. The Dewey system of classification is used, with Cutter book numbers.

The Laboratories.

The *Geographical and Geological Laboratory* equipment includes the following: Topographical atlas sheets of the United States to the number of several hundred; United States Coast and Geodetic Survey charts and Geological folios; Mississippi and Missouri river charts; pilot charts of the Atlantic and Pacific oceans; weather maps and charts; relief globe of the earth; relief maps of the United States and of selected localities; collections of common rocks and minerals; several hundred lantern slides; tables and facilities for moulding topographic features; books of reference.

The Department of Physics has an especially equipped lecture-room with stereopticon, hydraulic lift, pressure gages, vacuum gages, electrical instruments, and recording hygrometer. The lecture table is provided with water, compressed air, steam, and Chapman pump for producing vacuum. The rooms for the use of the department are a general physics laboratory, departmental library, apparatus and preparation room, photometric rooms, private workroom, advanced laboratory, electrical measurements room, and photographic rooms. In the

general physics laboratory each table is provided with four slate-lined fuse boxes, from which different currents for use in testing may be obtained. The reference library is supplied with a large assortment of books on the subjects of Physics and Electricity, and the leading periodicals of this country and Europe. The photometric room is equipped with a Lummer-Brodhun photometer and standard lamps.

The work-room is in charge of a competent mechanician, and is equipped with an eight-inch Rivett precision lathe, with attachments for milling, grinding, and screw-cutting, a Walker grinder, and numerous hand tools.

The laboratories are fully equipped with all apparatus for quantitive work in general physics and electricity. Some of the more recent additions to the outfit for work in light are the following: A Schmidt and Haensch spectrometer, a Schmidt and Haensch polariscope, a Michelson interferometer, and a Newton lecture-room polariscope.

The electrical equipment consists of standards of resistance, capacity, self-induction, and electromotive force; resistance boxes, bridges, galvanometers, and electrometers from Nalder Brothers & Co., Elliott Brothers, and Hartmann & Braun; also dynamometers and Weston & Whitney voltmeters, and ammeters of various types and ranges. A twelve-inch induction coil furnishes an important part of the equipment. Specially designed switch-boards are located in the lecture-room and general laboratory. The latter is equipped with a Weston voltmeter, a Weston ammeter, and an automatic circuit breaker.

The apparatus in the engineering laboratories is also available for use in the department of physics.

The rooms assigned to the *Department of Chemistry* occupy the west end of the fifth floor. They include a lecture room, departmental library, general laboratory, analytical laboratory, organic laboratory, balance room, and store room. The lecture room has a seating capacity of 300. The laboratories are furnished with convenient desks, supplied with water and gas. In each laboratory there is a liberal number of hoods, each of which is exhausted by an electric fan. The store room is sup-

plied with all the apparatus needed for the courses as outlined. It also contains a full list of chemicals, both organic and inorganic, including a set of specimens of the most important naturally occurring compounds of each element. The balance room is provided with Sartorius analytical balances. The department library includes the best English, German, and French reference works, and the current English and American periodicals.

The east end of the fifth floor is used for the work in *Domestic Economy.* It contains a lunch room and a kitchen, a cooking laboratory, and recitation rooms.

The *Lunch Room* is large, airy, furnished and decorated with taste. Lunch is prepared in the Institute kitchen, under the direction of the instructor in domestic economy. The bill of fare always includes soup, milk, chocolate, sandwiches, fruit, and a warm dish, such as meat-pie or baked beans, and usually a salad and a light dessert. Students who bring their lunches from home are permitted to use the lunch room tables. They may, if they desire, supplement their lunches with articles from the bill of fare.

Next to the lunch room is the *Cooking Laboratory.* This has accommodations for sixteen students, with every facility for individual work.

The Shops and Engineering Laboratories.

The *Foundry,* on the sixth floor of the engineering building, is well lighted from skylights in the roof and windows in the side and end.

The moulding floor is made of cedar block placed on end, and the floor around cupola and furnaces is of brick. There are places for sixteen students, each having a moulding floor and a bench, each bench having an equipment of a shovel, riddles, rammers, bellows, trowels, slicks, lifters, strikes, gate cutters, etc., necessary for ordinary moulding.

The remaining equipment consists of a core room, having a core bench with bins for the different materials used; a core oven 4 feet wide by 6 feet long by 6 feet high, which can be

fired either by gas or coke, and rack for core boxes and stock cores; two cupolas, one 16 inches inside the lining, hung from ceiling on trunnions, the other 24 inches inside the lining, supported on 4 posts; two brass furnaces; a 24 inch by 38 inch rattler; a double emery grinder, and an 18 inch cupola fan. The machinery is driven by a 5 horse-power electric motor. A 16-foot hand-power traveling crane runs from the cupola nearly across the building and commands the floor used for large work. A track suspended below the crane track runs from the cupola to all the moulding floors, and is used to carry a large ladle of iron from which small ladles are filled when pouring. A small electric hoist elevates material from the moulding floor to the charging platform. A class room and an office open off the foundry. In the center of the building above the sixth floor is a room used for pattern storage.

The *Pattern Shop* on the fifth floor is equipped with eight double benches, each side having a vise, a general closet, and four locked drawers. The closets in the benches contain the general tools used by the students in common, and the drawers contain sets of edged tools for the use of the individual student. Special tools and supplies are kept in the tool room. The machines in the pattern shop are one 24 inch 12 feet, and three 16 inch 6 feet, overhanging spindle lathes; two 12 inch 5 feet, and two 11 inch 4½ feet lathes; one 26 inch surface planer; one universal circular cut off and ripsaw; one 36 inch band saw; one grindstone; one emery tool grinder, and one universal trimmer. A case of individual lockers is provided in which students keep small work while in the process of construction, and a special room is provided for keeping larger work. The saws and planes are belted to individual motors, and the lathes are driven from two short line shafts, each of which is driven by a motor. A class room and an office open off the shop.

The *Elementary Wood Shop* is equipped with nine double benches similar to those in the pattern shop, and has also four 10-inch by 3½ feet, and fourteen 11-inch by 3½ feet lathes driven by a 10 horsepower electric motor.

The *Machine Shop* is on the fourth floor and occupies two separate rooms. The shop at the north end of the building is for elementary machine work, and the south shop is for advanced students. Between the two shops, and communicating with both is the tool and stock room, where all small tools and supplies are kept.

The equipment of the elementary shop consists of one 12-inch 5-foot engine lathe, with draw chucks and taper attachment; three 4-inch 6-foot, and one 15-inch 6-foot engine lathe with taper attachment and compound rest; seven 14-inch 6-foot, and one 15-inch 6-foot plain engine lathe; two 12-inch 4-foot speed lathes; one 16-inch crank shaper; one 18-inch rack shaper; one No. 1 plain miller; one double-wet emery tool grinder; one 18-inch drill press, and sixteen vises placed on a bench running along two sides of the shop. A bank of raised seats from which a good view of the different machines can be obtained is placed in one corner of the room to be occupied by students when general instruction is given. Near the entrance is placed a case of small lockers in which the students keep their work and individual tools. The machines in this room are driven by a 10-horsepower electric motor, attached to the ceiling.

The *Machine Shop* for advanced work is equipped with one 24-inch 16-foot engine lathe, with compound rest and taper attachment; one 18-inch 12-foot engine lathe with compound rest; one 16-inch 8-foot, and one 15-inch 6-foot engine lathe, with taper attachments; one 14-inch 6-foot tool makers lathe with compound rest, draw chucks, and taper and backing off attachment; one 14-inch 6-foot plain engine lathe; two 12-inch 4-foot speed lathes; one No. 3 screw machine, with vise feed; one No. 2 universal miller; one No. 3 universal miller; one No. 2 universal grinder; one 26-inch rack shaper; one 24-inch x 24-inch x 6-foot planer; one 24-inch back geared drill press; one 13-inch sensitive drill press; one wet emery tool grinder; one universal cutting grinder; one circular cut-off saw; six vises placed on wood benches along the walls on two sides of the shop; and four vises on iron benches placed

on the erecting floor and among the machines. All the tools in this shop are driven by independent direct current motors, with a speed changing device placed on each machine. On one side of the shop is a case of small lockers in which students keep their work and individual tools. In the tool room are kept the general tools and cutter holders belonging to the machines, all the small tools, scales, standard gaugers, measuring instruments, supplies, and general stock used in the work of the shops. The tool room is in charge of an attendant who, by means of the check system, issues tools to students as they are needed in their work. A 16-foot hand power traveling crane, mounted in the center of the shop so that it can traverse the whole width of the building, provides for the handling of heavy work and parts of machines and tools. A class room and an office open off the shop.

The *Forge Shop* is in the basement of the engineering building, but is well supplied with light during the day by windows on three sides, and at night with arc lights. The equipment consists of sixteen ordinary forges; four large forges for ordinary work; one gas tempering forge; one heating forge; one annealing and case hardening furnace; three 250 pound, one 200 pound, and fourteen 150 pound anvils; one 200 pound steam hammer; the hand hammers, sledges, fullers, swages, punches, chisels, tongs, and similar tools necessary for ordinary forge work; one bar shear for cutting stock; one hardening tank with pipe for circulating water; and one water cooled oil hardening tank. A 12-foot hand-power traveling crane handles large work for the steam hammer, large forges, heating and annealing furnaces, and the hardening tanks. The smoke from the forges is taken away through down draft hoods by a 60-inch steel exhaust fan, and the blast is supplied by a 24-inch blower, both being driven by a 15 horsepower motor. A post drill, a double emery grinder, and a blower for the gas forge are driven from a separate motor. A laboratory for the special investigation of the physical and chemical properties of iron and steel is conveniently situated above the stock room, and a class room opens off the shop.

The *Electrical Engineering Laboratory* is on the third floor of the engineering building. Its function is to supplement the work of lecture and class rooms in training students in the principles of electrical engineering. The apparatus is typical rather than special, and represents the most recent practice. The equipment includes one 33 K. W. direct current motor and one 23 H. P. direct current motor, used for driving line shafting; twelve direct current motors, 5 K. W. and smaller; one 35-light arc dynamo; one 5 K. W. two phase alternator; one 6 K. W. two phase rotary converter; one 5 K. W. two and three phase rotary converter; one 7½ K. W. double current generator, two and three phase and direct current; one 2½ K. W. rotary converter for electrolytic work and welding, converting from 110 volts direct current to 8 volts direct current and 6 volts three phase alternating current; two 2 H. P. single phase induction motors; one 3 H. P. three phase induction motor; one 5 H. P. three phase variable speed induction motor with three phase secondary, mounted on a cradle dynamometer, and available as an induction motor, generator, or regulator, as a three phase stationary transformer, or as a frequency changer; four 2½ K. W. transformers with 2 to 3 or 3 to 2 phase connections; four 5 K. W. transformers with a wide range of voltages; one 7½ K. W. welding transformer; one 5 K. W. 30,000 volt testing transformer with instruments; one constant current series arc transformer with lamps; one constant current arc regulator; apparatus for transforming from constant pressure to constant current; one condenser compensator; one 10 K. W. integrating polyphase wattmeter; artificial transmission lines; a large number of indicating instruments, resistances, reactances, etc.

The *Mechanical Laboratory* is located on the second floor and covers a floor space fifty by sixty feet. The apparatus in this laboratory is concerned largely with mechanical transmission, efficiencies, and testing of instruments. In the equipment are various forms of transmission and absorption dynamometers, belt testing machine, Reeves variable speed counter

shaft, steam engine indicator spring tester, fifty foot mercury column, deadweight oil gauge testers, lubricating oil testers, Chetalier pyrometer, smoke analysis apparatus, various forms of coal calorimeters, standard weights and thermometers. The motive power of this room is supplied by a 20 H. P. electric motor hung on a cradle dynamometer.

The *Strength of Materials Laboratory* occupies one-half of the first floor of the engineering building. It has an area of 3,000 square feet. The laboratory has a complete equipment for testing steel and other metals for ultimate resistance, elastic limit, etc., in tension, compression, and shear. It is also equipped for testing timber, cement, rope, etc. The principal machines installed are: A 200,000 pound Olsen, a 40,000 pound Riehle, a 1¼ inch by 4 foot Olsen torsion, a dynamograph for finding the machinability of materials, a Keep dead load, and a Keep impact for cast iron, and a 2,000 pound Fairbank current tester.

The *Steam Laboratory* is in the northwest corner of the basement of the main building, and covers about five thousand feet of floor space. It is fitted for a great variety of work in compressed air, ammonia, and steam. Included in its equipment are a 30 H. P. return flue boiler, arranged for natural or induced draft; a vertical pipe smoke economizer; a 7x12 straight line engine, capable of attachment to an Alden water brake, as well as the ordinary forms of brake; an experimental engine, arranged to take various forms of valve, easily changeable; a gas engine, capable of many adjustments and arranged with gas and air meters; a surface condenser with necessary weighing tanks; an air and ammonia compressor in connection with a half-ton refrigerating system; air tanks capable of withstanding 1,200 pounds pressure; five forms of injectors, arranged for complete mechanical and heat efficiency tests; various pumps, calorimeters, indicators, etc.

The *Hydraulic Laboratory,* with a floor space of about 3,000 square feet, is located in the north end of the basement, engineering building. It is equipped with weighing tanks,

pressure tanks, weir tanks, stand pipe, rotary and reciprocating pressure engines, water wheels, and motors, for the investigation of dydraulic machinery and the demonstration of the mechanics of hydraulics.

The Drawing Rooms.

The rooms for elementary, mechanical, and freehand drawing, each having a floor space of about one thousand square feet, are located on the sixth floor of the main building, and are provided with drawing room furniture suited to the requirements of the work. The light is admitted from above, through large skylights.

The rooms for advanced courses in drawing and design are in the engineering building, four on the sixth floor, two on the fifth, and one on the fourth floor. They aggregate about five thousand square feet of floor space and are amply lighted and furnished. Their proximity to the foundry, pattern, and machine shops makes it possible to co-ordinate, to an unusual degree, the design and constructive branches.

The blue-print room is on the mezzanine floor above the sixth, and is approached through a drawing room on the sixth floor. It is equipped with a 40x52 inch curved glass blue print machine, tracing files, blue print baths, etc.

The School of Arts.

Admission.

Each candidate for admission is required to furnish a testimonial of honorable dismissal from the school last attended. He must also refer to two persons, preferably his teachers or employers, from whom information about him may be obtained.

Candidates from Chicago grammar schools and other schools of equal rank, who have completed satisfactorily the work of the eighth grade, may be admitted without examination, upon recommendation of the principal of the school from which they come. Application for admission should be made in person, upon one of the days set for the regular entrance examination.

Candidates for admission other than those mentioned above are examined as follows:

1. English. The candidate will be expected to write, neatly and legibly, a few paragraphs on one of several subjects assigned by the examiner. These subjects will require no special or "school" knowledge, but will draw upon the student's past experience of ordinary life. Because this is the fact, the candidate will be expected to spell correctly all the words he uses in his paper. He is advised to use no word concerning the spelling of which he is in doubt.

The candidate will further be expected to answer questions of average difficulty concerning English grammar, as treated in such a book as Kittredge and Arnold's The Mother Tongue, Part II, or Lewis's Applied English Grammar. Ability to understand the relations of the parts of a complex sentence to each other is a good indication of the degree of maturity required in the successful applicant.

2. Arithmetic. The examples set will be practical problems in common and decimal fractions, common measures, and per-

centage as it is applied in ordinary business. Mental arithmetic from dictation will be a part of the examination, and both the facility and the accuracy of the candidate will be tested.

3. History of the United States. Pupils will be expected to know something of the settlement of North America; the Revolutionary War, the War of 1812, and the Civil War; the inventions that have favored trade and manufactures; compromises and legislation concerning State Rights and Slavery. Some knowledge will be required concerning the biography of famous Americans and concerning questions of the day.

4. Geography. The examinations will be given in the form of outline maps on which natural features, lines of communication, and other geographical facts are to be located. The pupil should have an accurate knowledge (1) of the location of the more important physical features (mountains, plains, seas, rivers, etc.); (2) of the important political subdivisions (countries, states and chief cities); (3) of the important natural resources; and (4) of commercial geography. In all these respects emphasis should be placed on the geography of North America and Europe.

Candidates for advanced standing are admitted upon presentation of certificates from Chicago high schools and other schools of equal rank, and are assigned to classes upon the basis of these certificates. Any such standing is regarded as probationary until confirmed by examination. The examinations are held during the first week of each school year, and take the form of recitations, oral and written, which determine the candidate's fitness to continue the work in the classes to which he has been assigned. The Institute reserves the right to revise such standing if it should appear that the student needs more time for preparation in any given subject.

Assignment of Studies.

A student on entering the Institute is assigned to such studies as seem to be best suited to his individual aims and needs as far as these can be determined from personal consultation and from an examination of the record of work done elsewhere.

This assignment is made for a term of three months and is revised each quarter in the light of the work of the preceding quarter. The progress a student makes depends on his own ability and application, and is quite independent of what others are doing.

Definition of a Credit.

The satisfactory completion of a course of instruction which requires sixty hours, counting time of preparation and recitation, or time devoted to laboratory, drawing, or shop work, is reckoned as a credit.

The Academic Certificate.

To obtain the Academic Certificate the student must receive 90 credits, of which 42 are prescribed as follows: English 18, algebra and geometry 12, foreign language 12. The remaining 48 credits are not elected by students, but are arranged for and planned with them with the view of helping them to make the best use of their time and talents and opportunities.

The Title of Associate in Arts.

To obtain the Title of Associate in Arts the student must secure 144 credits, of which 69 are prescribed as follows: English 21, mathematics 18, foreign languages 18, history 6, physics or chemistry 6; leaving 75 credits to be selected according to the varying needs of different students.

Suggestive Curricula.

On pages 28 and 29 four Suggestive Curricula are outlined, which are designed to suggest to patrons and students some of the various combinations of studies that may be made, and the order in which they may most profitably be taken. The first curriculum puts the emphasis on science and modern languages. The second is a modification of the first, designed to meet the needs of young women who specialize in domestic economy. The third and fourth are made up of such courses of instruction as are commonly required for the bachelor's degree in colleges of liberal arts.

Special Courses of Instruction.

As a rule, students are expected to take up the work of some one of the curricula outlined above, in which such choice of studies is allowed as is calculated to meet their needs. There may be those, however, who will be obliged to confine their work to one or two subjects of study. This may be done when the circumstances seem to justify it, subject to such conditions as may be imposed by the Director.

Time Requirement.

The time required for the completion of the work of any one of the curricula will vary with different students, according to their ability, health, application, and time for study. Students whose school work has been in no way interrupted should be prepared for admission to the Institute at the age of fourteen years, and if able to give the working hours of the day to their school duties, they should complete the studies of any one of the curricula in six years.

Half-Day and Evening Courses.

Many boys and girls are obliged to leave school in order to take care of themselves and those dependent upon them, at a time when their more fortunate associates enter upon such courses of instruction as are herein outlined. Such as can attend the Institute but half of each day may, by prolonging the time requirement, complete the work of some one group of studies, or at least perfect themselves in one or more subjects. Provision has also been made for such instruction at night as enables young men and women who are employed during the entire day to continue their education along those lines which will be of the most service to them in the work in which they are engaged.

1. SCIENCE AND MODERN LANGUAGES.

Year.	Autumn Quarter.	Course No.	No. of Credits.	Hours in Class.	Winter Quarter.	Course No.	No. of Credits.	Hours in Class.	Spring Quarter.	Course No.	No. of Credits.
First.	English	1	2	1	English	2	2	1	English	3	2
	Mathematics	1	2	2	Mathematics	2	2	1	Mathematics	3	2
	Latin	1	2	1	Latin	2	2	2	Latin	3	2
	Physiography or	2	2	2	Physiography or	1	2	2	Physiography or	2	2
	Shopwork or	2	..	..	Shopwork or	2	..	..	Drawing or	2	..
	Drawing	1	..	..	Domestic Economy	1	..	..	Domestic Economy	2	..
	Total	....	8	6	.....	....	8	6	.....	....	8
Second.	English	4	2	1	English	5	2	1	English	6	2
	Mathematics	4	2	1	Mathematics	5	2	2	Mathematics	6	2
	Latin	4	2	2	Latin	5	2	1	Latin	6	2
	History	1	2	1	History	2	2	1	History	3	2
	Total	....	8	5	.....	....	8	5	.....	....	8
Third.	Mathematics	12	3	1	History	4	3	1	History	7	3
	Physics	1	3	3	Physics	2	3	3	Physics	3	3
	German	1½	3	1	German	3	3	1	German	4½	3
	Total	....	9	5	.....	....	9	5	.....	....	9
Fourth.	English	7	3	1	English	8	3	1	Mathematics	10	3
	Chemistry	1	3	3	Chemistry	2	3	3	Chemistry	3	3
	German	6	3	1	German	7½	3	1	German	9	3
	Total	....	9	5	.....	....	9	4	.....	....	9
Fifth.	English	9	3	1	English	10	3	1	English	11	3
	Chemistry	4	3	3	Chemistry	5	3	3	Chemistry	6	3
	French	1½	3	1	French	3	3	1	French	4½	3
	Total	....	9	5	.....	....	9	5	.....	....	9
Sixth.	History	9	3	1	History	10	3	1	History	11	3
	Biology	1	3	2	Biology	2	3	2	Biology	3	3
	French	6	3	1	French	7½	3	1	French	9	3
	Total	....	9	4	.....	....	9	4	.....	....	9

2. * DOMESTIC ECONOMY.

Fifth.	English	9	3	1	English	10	3	1	English	11	3
	Chemistry	4	3	3	Chemistry	7	3	3	Chemistry	8	3
	Domestic Economy	A	2	2	Domestic Economy	B	2	2	Domestic Economy	C	2
	Total	....	8	6	.....	....	8	6	.....	....	8
Sixth.	Biology	1	3	2	Biology	2	3	2	Biology	3	3
	French	1½	3	1	French	3	3	1	Chemistry	12	3
	Domestic Economy	6	2	2	Domestic Economy	7	2	2	Domestic Economy	8	2
	Total	....	8	5	.....	....	8	5	.....	....	8

* For first four years, see Science and Modern Languages.

3. *LATIN AND MODERN LANGUAGES.

Year.	Autumn Quarter.	Course No.	No. of Credits.	Hours in Class.	Winter Quarter.	Course No.	No. of Credits.	Hours in Class.	Spring Quarter.	Course No.	No. of Credits.	Hours in Class.
Third.	Mathematics..	12	3	1	History	4	3	1	History	7	3	1
	Latin	7	3	1	Latin	8	3	1	Latin	9	3	1
	French	1½	3	1	French.....	3	3	1	French.....	4½	3	1
	Total	....	9	3	.....	....	9	3	.....	....	9	3
Fourth.	English	7	3	1	English	8	3	1	Mathematics..	10	3	1
	Latin	10	3	1	Latin	11	3	1	Latin	12	3	1
	French	6	3	1	French.....	7½	3	1	French	9	3	1
	Total	....	9	3	.....	....	9	3	.....	....	9	3
Fifth.	English	9	3	1	English	10	3	1	Mathematics..	14	3	1
	Latin	13	3	1	Mathematics..	13	3	1	Latin	14	3	1
	German.....	1½	3	1	German.....	3	3	1	German.....	4½	3	1
	Total.....	....	9	3	.....	....	9	3	.....	....	9	3
Sixth.	English	11	3	1	Latin	15	3	1	English	12	3	1
	Physics	1	3	3	Physics	2	3	3	Physics	3	3	3
	German.....	6	3	1	German.....	7½	3	1	German.....	9	3	1
	Total.....	....	9	5	.....	....	9	5	.....	....	9	5

4. *LATIN AND GREEK.

Third.	Mathematics..	12	3	1	History	4	3	1	History	7	3	1
	Latin	7	3	1	Latin.....	8	3	1	Latin	9	3	1
	Greek.....	1	3	1	Greek.....	2	3	1	Greek.....	3	3	1
	Total.....	....	9	3	.....	....	9	3	.....	....	9	3
Fourth.	English	7	3	1	English	8	3	1	Mathematics..	10	3	1
	Latin	10	3	1	Latin	11	3	1	Latin	12	3	1
	Greek.	4	3	1	Greek.....	5	3	1	Greek.....	6	3	1
	Total	....	9	3	.....	....	9	3	.....	....	9	3
Fifth.	English	9	3	1	English	10	3	1	English	11	3	1
	Mathematics..	13	3	1	Mathematics..	14	3	1	Latin	14	3	1
	Latin	13	3	1	Greek.....	8	3	1	Greek.....	10	3	1
	Total.....	....	9	3	.....	....	9	3	.....	....	9	3
Sixth.	Greek.....	9	3	1	Latin.	15	3	1	English	12	3	1
	Physics	1	3	3	Physics	2	3	3	Physics	3	3	3
	German.....	1½	3	1	German.....	3	3	1	German.....	4½	3	1
	Total.....	....	9	5	.....	....	9	5	.....	....	9	5

*For first and second years, see Science and Modern Languages.

Courses of Instruction in the School of Arts.

English.

Instruction is offered in English grammar, composition, oral reading, public speaking, and literature.

The historical grammar of English is not presented formally at any point in the course, but daily drill is given in matters of correct conversational usage.

In the teaching of composition the aim is to develop in the student the largest possible amount of practical power—the ability to present his own thoughts in clear and orderly fashion.

Throughout the course, practice is given in oral reading. No attempt is made to cultivate the elocutionary graces. Simple and intelligent reading is found to be an end sufficiently difficult to attain.

Throughout the course practice is given in public speaking. The pupil is expected to face the class and speak to it with simplicity and directness. He is urged to choose topics in connection with which he can appeal to his audience for definite action.

In most of the literary courses, masterpieces are chosen and presented, with reference to the ascertained interests and ideals of the student. In courses 7 and 8 this principle is subordinated to the "uniform college entrance requirements."

In courses 1-6 the regular text-books at present used are as follows: Lewis, First Manual of Composition, revised edition; Lewis, Introduction to the Study of Literature; Peabody, Old Greek Stories; Shakspere, The Merchant of Venice, edited by Miss Underwood; and numbers 21, 40, 27, 37, 133 in the Riverside Literature Series, being selections from Franklin, Hawthorne, Thoreau, and Warner, with Schurz's Life of Lincoln. These books are referred to below by abbreviations.

1.*(2) The chief object of Course 1 is correctness in speaking and writing English. Average sections cover First Manual, Chap. I., and Peabody. Special sections omit Peabody and receive more drill in correctness. *Autumn Quarter.*

*The figure in parenthesis indicates the number of credits that are given for the course. For definition of credit see page 26.

2. (2) Average sections cover First Manual, Chap. II., and Introduction, I.-V. Special sections take fewer chapters of literature and more drill in correctness. *Winter Quarter.*

3. (2) Average sections cover First Manual, III., and Introduction, VI.-X. Special sections abbreviate Introduction. *Spring Quarter.*

4. (2) Average sections cover First Manual, IV, Franklin (2), Hawthorne (40), and Thoreau (27). Special sections omit 21 or 27, or both. *Autumn Quarter.*

5. (2) Average sections cover First Manual, V., Schurz's Lincoln (133), and Warner (37). Special sections omit 37. *Winter Quarter.*

6. (2) Average sections cover First Manual, VI., and Merchant of Venice. Special sections omit Merchant of Venice. *Spring Quarter.*

1-6. Students who for whatever reason have not attained the degree of correctness required for entrance to course 7 are assigned to course 1-6, which amounts to a review of all preceding work in writing and speaking English. *Autumn and Spring Quarters.*

7. (3) LITERATURE AND COMPOSITION. The following masterpieces will be studied in 1903-1904; Shakspere's *Macbeth;* Milton's *L'Allegro, Il Penseroso, Comus, and Lycidas;* Burke's *Speech on Conciliation with the American Colonies;* Macaulay's *Essay on Milton* and *Essay on Addison.* *Autumn and Winter Quarters.*

8. (3) LITERATURE AND COMPOSITION. The following masterpieces will be read in 1903-1904: Shakspere's *Merchant of Venice* and *Julius Cæsar;* Addison's *Sir Roger de Coverley Papers;* Goldsmith's *The Vicar of Wakefield;* Coleridge's *The Ancient Mariner;* Scott's *Ivanhoe;* Carlyle's *Essay on Burns;* Tennyson's *The Princess;* Lowell's *The Vision of Sir Launfal;* George Eliot's *Silas Marner.* *Winter and Spring Quarters.*

9. (3) RHETORIC AND ENGLISH COMPOSITION. This course lays stress upon the structure of the whole composition, the paragraph, and the sentence. It affords practice in writing by twelve themes, illustrating the following species: Narration, description, translation, summary, exposition, argument. *Autumn Quarter.*

10. (3) ENGLISH LITERATURE AND COMPOSITION. This course is intended to serve as an introduction to the theory of literature; but on the principle that sane criticism presupposes an intimate knowledge of facts, a considerable body of English poetry is required to be committed to memory. Almost daily written work is required, in the form of brief criticisms and interpretations. *Winter Quarter.*

11. (3) ENGLISH COMPOSITION. The object of this course is threefold: To give a more technical theory of composition than that of course 9; to afford some practice in the construction of long themes, and to

secure fluency by daily themes illustrating many types. Much personal consultation is required. *Autumn and Spring Quarters.*

12. (3) SHAKSPERE. In 1902-03 the following plays were read, with a minimum of textual criticism, and a maximum of attention to Shakspere's art: *Romeo and Juliet, Henry IV.* (Part I.), *Twelfth Night, Hamlet, Coriolanus, King Lear, Antony and Cleopatra. The Winter's Tale, The Tempest.* *Spring Quarter.*

13. (3) THE ENGLISH ESSAY. A rapid survey is attempted of the history of the essay as an exponent of life and thought, particularly that of the present century. The authors studied in 1902-03 were Bacon, Browne, Swift, Hazlitt, Coleridge, Lamb, Landor, Newman, Carlyle, Emerson, Ruskin, Arnold, Pater, Stevenson. *Winter Quarter.*

14. PUBLIC SPEAKING. In connection with courses 9-11 a total of fifty short speeches is required of every student, over and above the regular work of these courses.

History.

The work in history, as outlined below, is designed to secure two results: first, a knowledge of the important facts of history; and second, the discipline and training that come from the nature of the subject-matter studied. In all courses special attention is given to correct methods of study and to the orderly arrangement and causal nexus of historical facts as a basis for subsequent work.

Courses 3, 4, and 5 are regarded as the essential part of the academic work. They are united in such a way as to form a connected history of the English-speaking people in Europe and America. Course 5 is a partial review and a continuation of courses 3 and 4, with more attention given to industrial and commercial growth, and relations. It is believed that the study of this phase of history, undertaken in this way, may be made more effective because of the opportunity for direct comparison.

Students may select, after consultation and approval, one or more of the three groups formed of courses 1 and 2, of courses 3 and 6, and of courses 4 and 7.

Courses 9, 10, and 11 have for their subject-matter the general history of Europe from the fourth century to the present time.

1. (2) HISTORY OF GREECE. In this course emphasis is placed upon the period of Greek history from the Persian wars to the Roman conquest, and upon those features of Greek life and civilization which became the common property of the East and of Rome.

2. (2) HISTORY OF ROME. The early republic, the territorial expansion and political development of Rome, the causes of the fall of the republic, the earlier and later empire form the subject-matter of the

course. As far as possible, the time is divided equally between the republic and the empire.

3. (2) HISTORY OF ENGLAND. This course covers the period of English history to the accession of George III., with the history of the English colonies in America. Besides giving a general knowledge of the subject, the aim of the course is to give such a knowledge of English political history as is necessary for course 5.

4. (3) HISTORY OF THE UNITED STATES. The course includes the colonial period from the accession of George III.; the progress of the colonies toward independence and union; the growth of the constitution, and the history of government under the constitution to the close of the reconstruction period. As in course 3, especial attention is given to those features of our history necessary for course 5.

5. (3) ENGLISH AND AMERICAN INDUSTRIAL HISTORY. A review of courses 3 and 4, with especial attention to the growth and development of agriculture, manufacture, and commerce, with some attention to the definition of economic terms and the fundamentals of economics.

6. (3) HISTORY OF ENGLAND. The subject-matter of this course is the history of England from the beginning of the Puritan movement to the present time. Special and intensive work is done upon selected topics and periods. Prerequisite: *Course 3.*

7. (3) HISTORY OF THE UNITED STATES. Special and intensive study of the subject from 1850 to the present time, with a review of the principal facts of political history and industrial development. Prerequisite: *Course 4.*

8. (3) CIVIL GOVERNMENT OF THE UNITED STATES. An analysis of the structure and working of government in the United States, local, state, and national. The text of the constitution is explained in the light of the present system, based when possible on court decisions.

9. (3) EUROPE FROM THE FOURTH TO THE FOURTEENTH CENTURY. An outline course in general European history covering the period from the Council of Nicea to the removal of the Papacy to Avignon, treating in such detail as the time will permit the civilization and institutions peculiar to the period.

10. (3) EUROPE FROM THE FOURTEENTH TO THE EIGHTEENTH CENTURY. From the exile to Avignon to the close of the Seven Years' War. An outline study of the Renaissance, Reformation, Counter Reformation, Religious and Dynastic wars, and the struggle for colonial and commercial supremacy.

11. (3) EUROPE SINCE 1763. The effect of the American Revolution on Europe, attempts at reform, the French Revolution, Napoleon, the Holy Alliance, reforms in England, and the unity of Germany and Italy are some of the subjects that will be considered in the course.

12. (3) THE FRENCH REVOLUTION. A study, as detailed as possible

in the time, of the history of France from the meeting of the States General to the establishment of the Directory. The design of courses 11 and 12 is to give an opportunity for more intensive study than has been possible in the other courses.

Mathematics.

A continuous and progressive course in pure mathematics for five years is offered, an outline of which is given below.

In the third year of the course, when students have some knowledge of elementary algebra, plane geometry, and trigonometry, ample opportunity is given to apply their knowledge in the study of physics; and in the sixth year students in engineering will have abundant use for their knowledge of mathematics obtained during the five years preceding.

Both the disciplinary and the practical purposes of mathematics will be kept in view, and an earnest attempt will be made to give due emphasis to each.

By repetition and reviews, it is believed, facility in the ready and masterly use of mathematics may be obtained, and the course, as a whole, has been planned with this purpose in view. Thus algebra is introduced in three distinct places in the course, geometry in three, trigonometry in two.

1. (2) ELEMENTARY ALGEBRA. Definitions and notations, positive and negative numbers, addition and subtraction of algebraic expressions, parentheses, multiplication and division, simple equations, factoring, highest common divisor, lowest common multiple.

Autumn and Winter Quarters.

2. (2) ELEMENTARY ALGEBRA, four days a week. Fractions, simple equations containing fractions, simple simultaneous equations, inequalities, involution and evolution. CONCRETE GEOMETRY one day a week.

Winter and Spring Quarters.

3. (2) ELEMENTARY ALGEBRA, four days a week. Theory of exponents, radicals, quadratic equations, simultaneous equations involving quadratics, theory of quadratic equations, ratio and proportion. CONCRETE GEOMETRY, one day a week. *Spring Quarter.*

4. (2) PLANE GEOMETRY. Elementary definitions, triangles, parallels, parallelograms, problems, loci of points. The geometric concepts should have been well fixed in mind during the two preceding quarters. In this course the emphasis is to be placed on the logical demonstration of the theorems, and solutions of problems.

Autumn and Winter Quarters.

5. (2) PLANE GEOMETRY. Equality of polygons, circles, inscribed and circumscribed triangles and quadrilaterals, ratio and proportion. Especial emphasis is placed on original exercises.

Winter and Spring Quarters.

6. (2) PLANE GEOMETRY, completed. The last four or five weeks of the quarter will be devoted to an elementary presentation of some of the most useful and fundamental facts of Plane Trigonometry.

Autumn and Spring Quarters.

6a. (3) SURVEYING. This course includes practical work with surveying instruments. *Spring Quarter.*

7. (2) ACCOUNTING. A study of common and decimal fractions, addition, percentage, discounts, commission, insurance, exchange bills, settlements, averaging accounts, and profit and loss. Special work in mental calculations. *Autumn Quarter.*

8. (2) ACCOUNTING. Introduction and use of main books used in accounting, and application of principles learned in course 7 to business transactions recorded in them. Exercises in opening and closing books, and practice in writing business papers. *Winter Quarter.*

9. (2) ACCOUNTING. The continued use of main books and the introduction of auxiliary books. A study of partnerships with methods of keeping accounts; adjusting profits and losses, making settlements and summarizing results. Business correspondence. *Spring Quarter.*

9a. (2) ACCOUNTING. Short methods; accounts of corporations, issue and transfers of stock, assessments and dividends. Banking business so far as is necessary to give the student an understanding of the position taken by a bank in business economy, and to enable him to deal intelligently with relations between a business house and a bank.

Spring Quarter.

10. (3) ELEMENTARY ALGEBRA, *reviewed and completed.* A review and more thorough study of the fundamental operations. The solution of equations, the theory of exponents and surds. Theory of quadratic equations, indeterminate equations of the first degree, inequalities, ratio and proportion, progressions. *Every Quarter.*

11. PLANE GEOMETRY, *reviewed,* with special emphasis on original problems and demonstrations. This course is not required of students who have completed courses 4, 5, and 6.

Winter and Spring Quarters.

12. (3) SOLID GEOMETRY. Lines and planes in space, pencil of planes, polyhedral angles, polyhedra, parallelopipeds, prisms and pyramids, the cylinder, cone, and sphere, similar solids.

Autumn and Spring Quarters.

13. (3) ALGEBRA. Permutations and combinations, the binomial theorem, limiting values and vanishing fractions, convergency and divergency of series, undetermined coefficients, summation of series, introduction to the theory of equations.

Autumn and Winter Quarters.

14. (3) TRIGONOMETRY. Plane trigonometry, with an introduction to spherical trigonometry. *Winter and Spring Quarters.*

15. (3) PLANE ANALYTICAL GEOMETRY. Systems of co-ordinates; the equations and properties of the point, straight line, circle, parabola, ellipse, and hyperbola; the general equation of the second degree. *Spring Quarter.*

16. (3) DIFFERENTIAL CALCULUS. The elements of differential calculus. *Fall Quarter.*

17. (3) INTEGRAL CALCULUS. The elements of integral calculus. *Winter Quarter.*

18. (3) APPLIED CALCULUS. Applications of calculus to the integrations most frequently required in engineering subjects; intended to familiarize the student with the use of calculus as a practical instrument in mechanics, thermodynamics, and electricity. *Spring Quarter.*

Physiography.

In the courses in physiography and geology, lectures, recitations, and laboratory methods of work are used. The student is not confined to a single text-book, but is required to consult different authors. Maps, charts, and lantern views are freely used, and the students are encouraged to draw upon their store of mental pictures of familiar landscapes. So far as possible general principles are deduced from the facts thus brought out. Each pupil is required to give definite expression to his ideas through recitations, written descriptions, sketches, and diagrams, and by moulding in sand. Opportunities are afforded for field excursions under the guidance of the instructor. The aim of the instruction is the training of the powers of observation and reasoning, as well as the acquisition of useful information. To aid in the carrying out of this plan, the department possesses a large assortment of topographical maps, geological maps, coast and river survey charts, relief models, weather maps, lantern views, facilities for moulding the land forms, and the more important books of reference.

1. (2) PHYSIOGRAPHY. The motion of the earth and its relation to the sun and moon; elementary meteorology and climatology; distribution, movements, and deposits of the ocean. *Winter Quarter.*

2. (2) PHYSIOGRAPHY. The land: The modern doctrines of the origin and development of the surface features of the earth, the agencies involved, and the resulting forms are carefully studied and classified. A limited number of field excursions are made. *Autumn and Spring Quarters.*

Course 2 may precede or follow course 1, according as the work is commenced in the autumn or winter.

4. (3) GENERAL GEOLOGY. The elementary features of dynamical, structural, and historical geology. Emphasis is placed upon the leading facts and principles of the science, and the more important events of geological history.

Prerequisite: *Courses 1 and 2; Physics 1-3 and Chemistry 1-3, or their equivalent.*

5. (3) PHYSIOGRAPHY AND COMMERCIAL GEOGRAPHY OF THE UNITED STATES. A study of the physiographic features of the United States, with reference not only to their present form, but also to the successive stages of their development, and their effect upon mankind; the effect of natural resources and physiographical features on the location of cities and in determining the industries, the lines of transportation, and the prosperity of the people. Lectures, recitations, library and laboratory work.

Prerequisite: *Courses 1, 2, and 4, or their equivalent.*

6. (3) METEOROLOGY. Observational study of atmospheric phenomena supplemented by lectures, recitations, and reference work, by which an intelligent comprehension of the facts and theories of the science is gained. A part of the observational work will be done in connection with courses 4 and 5.

Courses 4, 5, and 6 are designed to afford a continuous year's work in the study of the earth, and should be elected as a unit.

Physics.

The work of the department consists of courses in general physics, together with special courses for students in engineering.

The design of the courses in general physics is to familiarize students with the principles of physics, and to cultivate correct methods of laboratory work, and also to serve as an introduction to applied mathematics. Attention is given to the preparation of records, the manipulation of apparatus, and to the cultivation of the patience necessary to secure the best results.

The advanced courses may not be taken until the student has had such work in mathematics as will enable him to solve the problems that arise in lecture discussion and detailed laboratory practice. These courses are designed for students who intend to specialize in physical science or in engineering.

1. (3) GENERAL PHYSICS. Mechanics: A discussion and illustration of physical quantities and their measurement; simple types of motion; density, velocity, acceleration, force, work, power and efficiency, elasticity, and surface tension. *Autumn Quarter.*

LABORATORY PHYSICS. Strictly quantitative, covering subjects named above. *Autumn Quarter.*

2. (3) GENERAL PHYSICS. Heat: Thermometer, expansion, calorimetry, change of state, solutions, transference of heat, and theory of gases. Sound: Waves, sounds and their relations, sonorous bodies, compound tones and musical instruments. Light: Nature and propagation, reflection, refraction, theory of optical instruments, interference,

dispersion, radiation and absorption of light waves, color, and polarization. *Winter Quarter.*

LABORATORY PHYSICS. Quantitative work in heat, sound and light. *Winter Quarter.*

3. (3) GENERAL PHYSICS. Electricity: Electrification, the electric field, electrostatic instruments, electric discharges, magnetism; the electric current, the electromagnetic field, relations between heat and electricity, units, telegraph and telephone, and electric waves. *Spring Quarter.*

LABORATORY PHYSICS. Quantitative measurements of current, electromotive force and resistance; testing batteries of incandescent lamps, arc lamps, motors and generators, calibration of instruments. *Spring Quarter.*

4. (3) MECHANICS: Standard units; dimensions of dynamical units; properties of matter; measurements of precision in length, mass, and time; kinematics; statics; dynamics; special problems.

Prerequisite: *Mathematics 14.* *Autumn Quarter.*

5. (3) HEAT, SOUND, AND LIGHT: Calorimetry; radiation; conduction; thermodynamics; kinetic theory of gases; kinds of vibration; media of propagation; measurement of sound waves and light waves; interference, reflection, and refraction of waves; physical theory of music; photometry; special problems for advanced students.

Prerequisite: *Mathematics 14.* *Winter Quarter.*

6. (3) ELECTRICAL MEASUREMENTS: Magnetism; magnetic units; measurement of earth's field; electrostatics; electromagnetism; electromagnetic units; electrodynamics; measurement of resistance, current, electromotive force, quantity, capacity and temperature coefficients; calibration of instruments; electromagnetic theory of light.

Prerequisite: *Mathematics 14.* *Spring Quarter.*

7. (3) ADVANCED ELECTRICAL MEASUREMENTS: Continuation of course 6. Temperature coefficients; quantity and capacity; self and mutual induction; permeability and hysteresis of iron and steel; calibration of commercial instruments; wireless telegraphy apparatus. Latitude will be allowed the student in choosing any special line of investigation which he wishes to pursue.

Prerequisite: *Course 6.*

8. (3) PRIMARY AND SECONDARY BATTERIES: Historical development; modern theories; reactions; uses of different types; complete tests of primary and storage cells; care and maintenance.

Prerequisite: *Course 6 and Chemistry, 1.*

9. (3) ELECTRO-METALLURGY. Testing of primary and secondary batteries; electroplating; resistance of electrolytes; Faraday's laws; special investigations in electrolysis.

Prerequisite: *Course 8 and Chemistry, 1.*

10. THEORIES OF PHYSICS. Advanced course in heat, sound, or light, supplemented by research work in the laboratory.

Prerequisite: *Course 8 and Mathematics, 17.*

Chemistry.

The aim of the courses in chemistry is to give in the first place a knowledge of the fundamental principles of the science as a part of a general education; and afterwards a more extended knowledge of the subject and practice in manipulation to those who wish to devote themselves to pure or applied chemistry, or whose work along other lines will be made more efficient by a thorough training in chemistry. In the advanced work in chemistry a reading knowledge of German is assumed. Engineering students are encouraged to become familiar with the principles on which manufacturing processes or industrial methods are based, so that a firm foundation is laid for subsequent specialization in these directions. Opportunities are given for excursions to the plants of chemical industries located in and near Chicago.

All students taking courses in chemistry are required to deposit two dollars each quarter to cover charges for breakage. If the charges do not amount to the sum deposited, the excess is returned to the student.

The courses in elementary chemistry aim to develop the reasoning and observational powers of the student on scientific lines, and lead him by actual experiment to acquire a knowledge of the more important substances, possessing an economic interest, that are encountered in daily life. Most of the time is devoted to laboratory work, the recitations being chiefly utilized for systematizing the results thus obtained.

Lectures and recitations, four hours a week; laboratory work, six hours a week.

A. (2) ELEMENTARY CHEMISTRY. General introduction; physical and chemical properties characteristic of the states of matter; chemical separation: water, air, etc. *Autumn Quarter.*

B. (2) ELEMENTARY CHEMISTRY. Continuation of Course A. Study of some of the non-metals and their more important compounds. *Winter Quarter.*

C. (2) ELEMENTARY CHEMISTRY. Continuation of Course B. Completion of the non-metals. Introduction to some of the more important metals. *Spring Quarter.*

The courses in general chemistry give a knowledge of the natural occurrence, methods of preparation, properties and reactions of the important elements and compounds, explain these facts according to modern theories, and point out their application to industrial processes. Instruction is given by means of lectures and recitations, illustrated by experiments whenever advantageous. In connection with each subject studied the student is required to read some standard work. The

greater part of the laboratory work is qualitative, but it includes quantitative experiments involving both gravimetric and volumetric methods, and also a few inorganic preparations on a somewhat elaborate scale. Lectures and recitations, five hours a week; laboratory work, ten hours a week. Reference book, Newth's Inorganic Chemistry.

Prerequisite: *Courses A-C or Physics 1-3.*

1. (3) GENERAL CHEMISTRY. Chemical change, three states of matter, solution and crystallization, elements and compounds, oxygen, hydrogen, and the elements of the chlorine group. *Autumn Quarter.*

2. (3) GENERAL CHEMISTRY. Continuation of course 1. The remaining non-metallic elements; acids, bases, and salts; electrolysis. *Winter Quarter.*

3. (3) GENERAL CHEMISTRY. Continuation of course 2. The metals. Qualitative analysis is not taught, but some of the more important analytical reactions are studied, so that at the end of the course the student is expected to be able to recognize any simple salt and to understand the methods of separation of various groups and elements. *Spring Quarter.*

The work in chemistry of the second year begins with course 4, one quarter of qualitative analysis given in the fall. This course is prerequisite to all more advanced work. At the beginning of the Winter Quarter the students are divided into three groups. Those intending to pursue chemical studies beyond this year take courses 5 and 6, advanced qualitative and beginning quantitative. Those preparing for medicine or domestic economy, and those who wish a more general knowledge, take courses 7 and 8, organic chemistry. Engineering students take courses 6 and 9, quantitative analysis of engineering materials.

The courses in qualitative analysis begin with simple analysis and lead to the study of complex mixtures, minerals, alloys, etc. They include the methods of the recognition of the more common organic acids, and of various other substances of special interest and importance to medical students, together with toxicological work. The lectures treat in considerable detail of certain selected portions of theoretical and historical chemistry, special reference being made to the basis of analytical chemistry. Laboratory work, twelve hours a week; lectures and recitations, three hours a week. Text-book, Prescott and Johnson's Qualitative Analysis.

Prerequisite: *Courses 1-3.*

4. (3) QUALITATIVE ANALYSIS. Lectures on the theory of analysis. General analysis, including that of complex mixtures and minerals. *Autumn Quarter.*

5. (3) QUALITATIVE ANALYSIS. Continuation of course 4. Analy-

sis of alloys, etc. Toxocological methods. Lectures on theoretical chemistry. *Winter Quarter.*

6. (3) QUANTITATIVE ANALYSIS. Continuation of course 5. Simple gravimetric and volumetric exercises leading to course 9. Lectures and recitations on quantitative analysis. Reading of selected books and original memoirs. The books read during the past year were Von Meyer's History of Chemistry, Wurtz's History of Chemical Theory, Pattison Muir's Heroes of Science, Roscoe's John Dalton, Alembic Club Reprints —Nos. 2, 4, 7, 8, 9, 13. *Winter and Spring Quarters.*

The courses in organic chemistry consist of lectures and recitations on the simpler types of carbon compounds, and their preparation and purification in the laboratory. Lectures and recitations, three hours a week; laboratory work, twelve hours a week.

Prerequisite: *Courses 1, 2, 3, and 4.*

7. (3) ORGANIC CHEMISTRY. The work is based on Perkin and Kipping's Organic Chemistry. Aliphatic series. *Winter Quarter.*

8. (3) ORGANIC CHEMISTRY. Continuation of course 7. Aromatic series. *Spring Quarter.*

The courses in quantitative analysis include exercises in gravimetric, volumetric, and electrolytic methods and gas analysis. Theoretical work consists in the study of prescribed books and memoirs supplemented when necessary by lectures and recitations. Laboratory work, twelve hours; lectures and recitations, three hours a week.

9. (3) QUANTITATIVE ANALYSIS. Moderately complex gravimetric methods and volumetric analysis, including iron, coal, water, and furnace gas analysis, if desired. *Autumn Quarter.*

10. (3) QUANTITATIVE ANALYSIS. Continuation of course 9. Electrolytic separations and gas analysis. *Winter Quarter.*

11. (3) QUANTITATIVE ANALYSIS. Continuation of course 10. The course in this quarter is arranged to meet the individual demands of each student, who is thus enabled to specialize in any desired direction. *Spring Quarter.*

12. (3) FOOD ANALYSIS. The testing of foods for quality and purity. Text-book, Leffman and Beam's Food Analysis. *Spring Quarter.*

Prerequisite: *Course 7.*

Biology.

1. (3) BIOLOGY. Cell theory, evolution; karyokinesis, reproduction, development, regeneration. Typical species of animals with reference to structure, function, development, and relationships. Macroscopic and microscopic anatomy of representative animals and plants. Notes and drawings of forms studied. Preparation of material for microscopic study. Written thesis on some assigned subject.

Prerequisite: *Physics 1-3 and Chemistry 1-3.* *Autumn Quarter.*

2. (3) PHYSIOLOGY. Physiology of man and other higher animals. Circulation, respiration, secretion, digestion, nutrition, muscles, animal heat, central nervous system, special senses. Comparative anatomy, laboratory work, dissection of typical animals.

Prerequisite: *Course 1.* *Winter Quarter.*

3. (3) BACTERIOLOGY AND PHYSIOLOGICAL CHEMISTRY. Cultures and growth of germs. Disease, therapeutics, household and public sanitation.

Throughout the courses in Physiology and Bacteriology abnormal and pathological conditions of human organisms, and their relations to health, are considered.

Prerequisite: *Course 2.* *Spring Quarter.*

Latin.

The course of study in this department includes, in addition to the usual four years of training preparatory for college, all the work in Latin regularly required in the best colleges for the degree of A. B. The courses are planned with a view to the student's progressive development, and the acquisition of a constantly increasing grasp of the language which shall enable him to read Latin with understanding and comparative ease and, in the later years of his course, with some amount of literary appreciation of the authors read.

Correct pronunciation with special regard to quantity is insisted upon from the beginning, so that by the time the student has reached the study of Latin poetry the hexameter should present little or no difficulty. In the acquisition of a vocabulary emphasis is laid upon the grouping of related words. Grammatical accuracy and familiarity with the principles of the language are sought rather through careful and constant practice in reading and writing Latin than by the memorizing of abstract rules.

With a view to the development of speed and facility in reading special attention is paid to translating at sight and hearing, and to the practice of reading aloud in the Latin with a proper appreciation of the sense of the author. Translation from Latin into English is, from the beginning, regarded as a part of the student's work in English composition, and the careless or distorted use of English resulting from literal translation is not allowed. The translation of English into Latin forms an important part of every course, exercises being based in the main upon the text read, but in the later years simple English narrative is substituted. Literature is studied historically as an expression of the life of the people and with reference to the times and the circumstances under which the writers lived, and in the more advanced classes attention is paid to the elements of style and of literary criticism. Systematic supplementary reading is encouraged, for which ample op-

portunity is offered by a carefully selected library. The work of the classes is supplemented by stereopticon lectures illustrating the monuments of Rome, Roman antiquities, historical sites, and Roman private life.

1, 2. (4) ELEMENTARY LATIN. The student is introduced to the main principles of the Latin language by a series of graded exercises, intended to render him familiar with the elements of Latin grammar and syntax through their use in the Latin sentence rather than by memorizing abstract rules. Special attention is paid at the outset to correct pronunciation and the training of the ear.

Course 1, Autumn; Course 2, Winter Quarter.

3. (2) ELEMENTARY LATIN. The reading of easy Latin and an outline study of Roman history to the time of the Empire.

Spring Quarter.

4, 5. (4) CÆSAR, DE BELLO GALLICO. The Helvetian War, I, 1-29; The Belgian War, II; War with the Veneti, III, 7-16; Attack on Winter Quarters, V, 1-7, 24-55. For rapid reading, The General Uprising in Gaul, VII, 1-31, 34-36, 41, 44-53, 63-90, or Cæsar's Invasion of Britain, IV, 20-36, V, 1-23. *Course 4, Autumn; Course 5, Winter Quarter.*

6. (2) SELECTIONS FROM NEPOS, AND CÆSAR. *Spring Quarter.*

7, 8. (6) CICERO, ORATIONS AGAINST CATILINE. SALLUST, CATILINE. The orations of Cicero and Sallust's Catiline will form the basis of a study of the political and social conditions in Rome at the end of the Republic. That the student may feel in the Latin the spirit of the orations there will be frequent drill in reading aloud. In the work of Latin writing special attention is paid during these two quarters to the writing of continuous narratives.

Course 7, Autumn; Course 8, Winter Quarter.

9. (3) CICERO. PRO ARCHIA; PRO MARCELLO; SELECTED LETTERS. Prose writing as in courses 7 and 8. *Spring Quarter.*

10. (3) VIRGIL, ÆNEID, I, II. Special care is here given to the literary quality of the student's translations, and written translations of long passages are required. Formal drills in grammar are kept in the background so as to hinder as little as possible the student's interest in the story. Translations at sight, and weekly exercises in Latin writing.

Autumn Quarter.

11. (3) VIRGIL, ÆNEID, III, IV. This course is a continuation of Course 10. *Winter Quarter.*

12. (3) VIRGIL, ÆNEID, V, VI. Selections from Latin poetry. General review. Latin writing. *Spring Quarter.*

13. (3) CICERO, DE SENECTUTE. LIVY, Books XXI and XXII. Latin writing. Collateral reading upon Roman history.

Autumn Quarter.

14. (3) TACITUS, GERMANIA AND AGRICOLA. PLAUTUS, CAPTIVI OR TERENCE, PHORMIO. Latin writing. The history of Latin comedy. In connection with the study of the Germania, the accounts of early Teutonic institutions, given by Tacitus and Cæsar, will be compared.

Spring Quarter.

15. (3) HORACE, SELECTIONS FROM THE ODES AND SATIRES. Collateral reading upon the history and literature of Rome in the time of Horace. *Winter Quarter.*

16. (3) ROMAN PRIVATE LIFE. A systematic treatment of the life of the Romans with special reference to the first century of the Empire. The course will consist of lectures by the instructor (two days a week), illustrated by stereopticon views, and the reading of Pliny's Letters (three days a week). Each student will be expected to prepare, during the quarter, a paper on some social topic.

17. (3) SELECTIONS FROM JUVENAL OR TACITUS. Outline study of the history of Latin literature.

Greek.

Courses 1-6 are based on the requirements for collegiate credits (p. 26), as the college preparatory work usually covering three years is done in two years.

Academic students who have had two years in Latin may take these courses by such an arrangement of program as will allow the necessary fifteen hours a week. The six collegiate are equivalent to nine academic credits.

The following notes will indicate, somewhat in detail, the methods and the aims of the work in Greek, in courses 1-6.

1. With a view to the acquisition of a comprehensive vocabulary, special attention is given to the grouping of related words and to the memorizing of the various meanings of all the common words.

2. Reading at sight and from hearing form an important part of the instruction from the first.

3. A correct and fluent pronunciation of the Greek sentence is insisted on.

4. Exercises in prose on the text read are prepared for each recitation in Attic Greek. This work is supplemented by frequent tests in writing Greek without previous preparation.

5. As soon as possible an effort is made to develop in the student, by means of essays and discussions, an appreciation of the historical and literary value of what he reads.

Courses 8-12 have been outlined and are conducted with special reference to the interests both of those students who wish a general training in Greek before proceeding to specialize in other lines of work, and of those who intend to make Greek the foundation or center of

future specialization. It is believed that the courses offered, together with collateral reading and with discussions in the class room, will give a fairly broad idea of the scope of Greek literature and an appreciation of the relation of Greek to modern life and thought.

A careful review of the inflection and rules of syntax is made in connection with the study of Lysias. In all courses, particular attention is directed to sight reading and to the extension of the student's vocabulary, the aim being to cultivate the power to read rapidly at sight.

1. (3) ELEMENTARY GREEK. Emphasis is placed on the necessity of thoroughly mastering the essentials of the grammar. The fact that the student has had at least two years' training in Latin enables him to observe the similarities and differences between Latin and Greek, the value of this comparative study being that it makes the new language appear less strange and thus contributes materially to the learner's progress. The correct placing of accents and breathings is gained by constant practice in writing Greek. *Autumn Quarter.*

2. (3) ELEMENTARY GREEK. Anabasis, Book I, chapters 1-3. Composition; grammar. The modification of verbal stems, euphonic changes, and drill in the principal parts of irregular verbs claim special attention. The student's observation is directed to the principles of composition and derivation as an important aid in acquiring a vocabulary. *Winter Quarter.*

3. (3) THE ANABASIS, Books I, II (except I: 9 and II: 6). Greek writing; grammar. A review is made of the work of the preceding courses. Reading from sight and from hearing is emphasized. *Spring Quarter.*

4. (3) THE ANABASIS, Books III, IV, I: 9, II: 6. Greek writing. Reading at sight and from hearing of selections from Book V. Discussion of literary and historical questions arising in connection with the reading of the Anabasis. Xenophon's life and literary work. *Autumn Quarter.*

5. (3) HOMER, THE ILIAD, Books I, II, and III. The essentials of the structure of Homeric verse and the resemblances and differences between the Homeric and Virgilian hexameter are noted. The relation of the Epic to the Attic Greek and the essentials of Homeric syntax receive special attention. The study of words. Exercises in reading Attic Greek and in writing Greek. *Winter Quarter.*

6. (3) HOMER, THE ILIAD, Books VI, XXII, and XXIV, exercises in the writing of Greek. Some attention is given to the "Homeric Question," which is more fully discussed in Course 9. *Spring Quarter.*

8. (3) LYSIAS. Eight orations. HERODOTUS, Selections from Books VI and VII. Review of inflections and syntax. Composition. Collateral reading on history and on political antiquities. The rise of Attic oratory. *Winter Quarter.*

9. (3) HOMER, THE ODYSSEY, Books I-XIII. The study of words. The "Homeric Question." Comparison of Homer and Virgil.
Autumn Quarter.

10. (3) PLATO, APOLOGY AND CRITO. XENOPHON, MEMORABILIA. Greek writing. Readings and discussions on (1) the rise of Greek philosophy, (2) Socrates and the Sophists, and (3) Plato and Socrates.
Spring Quarter.

10a. (3) XENOPHON, SYMPOSIUM. PLATO, SELECTIONS FROM THE PROTAGORAS, GORGIAS, EUTHYDEMUS, AND REPUBLIC. The writing of Greek. Collateral reading. (Alternates with course 10.)
Spring Quarter.

11. (3) SELECTIONS FROM LUCIAN. DEMOSTHENES, PHILIPPICS. Lucian and his times. The development of Attic oratory. Demosthenes's importance in Greek literature and history. *Winter Quarter.*

12. (3) SOPHOCLES, THE ANTIGONE AND ŒDIPUS TYRANNUS. The origin and development of the Greek drama. Outline study of the history of Greek literature. *Spring Quarter.*

13. (2) ARISTOPHANES, THE ACHARNIANS AND THE CLOUDS. Lectures on the origin and development of Greek drama. The Greek theater. *Two hours a week.* *Winter Quarter.*

German.

The methods employed in this department are intended to establish a broad and thorough foundation for an appreciative study of German literature. Courses 1-9 cover a period of three years, when the study of German is begun in the earlier years of the course in the Institute. Separate classes are formed for those who commence German after a preliminary course in Latin. In these classes the work of the three years' course is accomplished in two years.

Accurate and intelligent pronunciation is considered a valuable means for securing accuracy in inflection and fluency in speaking. The principles of phonetics are presented in simple form and repeated practice on exercises prepared especially for this purpose is required both in the classroom and in the preparation of the lesson. Colloquial practice is introduced at the outset, taking at first the form of simple questions on the text, and increasing in difficulty until the entire recitation is conducted in German.

Translation from German into English is regarded as a means to an end, and is discarded when it is no longer needed as a test of the understanding of the text.

In composition direct translation from English into German is employed to some extent, but preference is given to reproductive exercises and independent themes. Exercises of this sort are required at least twice a week throughout the course.

The simpler principles of historical grammar are presented incidentally at an early stage in the course, and constant reference is made to the relation between English and German.

1. 2. (4) ELEMENTARY GERMAN. Drill on pronunciation; the inflection of nouns, adjectives, pronouns, and the simpler forms of verbs. Bierwirth's Grammar.

Course 1, Autumn Quarter; Course 2, Winter Quarter.

3. (2) ELEMENTARY GERMAN. Grammar continued. Verb forms are emphasized. Easy prose reading. *Spring Quarter.*

4. (2) READINGS IN EASY NARRATIVE PROSE. Continued drill on grammatical forms. Prose composition based on texts read.

Autumn Quarter.

5. (2) NARRATIVE PROSE AND ONE EASY COMEDY. Reproductive translation into German. Conversational exercises.

Winter Quarter.

6. (2) SCHILLER'S WILHELM TELL. Reproductive translation and independent themes. *Spring Quarter.*

7. (2) HISTORICAL OR BIOGRAPHICAL PROSE. Selections from Freytag's "Bilder aus der deutschen Vergangenheit," or Von Sybel's "Erhebung Europas gegen Napoleon," Jagemann's or Poll's German Composition, twice a week. *Autumn Quarter.*

8. (2) GOETHE'S GÖTZ VON BERLICHINGEN. Prose composition, reproductive work, and independent themes. *Winter Quarter.*

9. (2) A MODERN NOVEL. Sudermann's "Frau Sorge," or Ebner-Eschenbach's "Das Gemeindekind." Independent themes.

Spring Quarter.

9a. (2) Scientific German. This course is co-ordinate with German 9 in the literary course. No student is admitted who has not at least six credits in German. Scientific readers and monographs.

Spring Quarter.

10. (3) ADVANCED GERMAN. Lessing's Emilia Galotti and Hamburgische Dramaturgie. The life of Lessing is studied from English and German biographies, and his earlier dramas are read and reviewed by members of the class. *Autumn Quarter.*

11. (3) SCHILLER'S WALLENSTEIN AND THIRTY YEARS' WAR. Reference work in history. The structure of the drama is made the subject of especial study. *Winter Quarter.*

12. (3) GOETHE'S DICHTUNG UND WAHRHEIT. Many of the earlier productions of the author are read in connection with this work, especially Die Leiden des jungen Werther. Themes on topics suggested by the readings. *Spring Quarter.*

French.

The language is studied for its disciplinary value and for the intrinsic worth of the literature, as well as for the advantage to the scientific student in availing himself of information to be found in French works relating to his special course. Power to speak and ability to read French are sought as a means to breadth of culture. A systematic knowledge of the structure and idioms is obtained through double translation. In all exercises attention is given to the correct use of English.

Courses 1-9 cover a period of three years, when the study of French is begun in the earlier years of the course in the Institute. Separate classes are formed for those who commence French after a preliminary course in Latin. In these classes the work of three years' course is accomplished in two years. Certain changes, however, are made in the texts read in order to meet the requirements of more mature students. The following substitutions will be made: Le Gendre de Monsieur Poirier (Augier); La Question d'Argent (Dumas); Cyrano de Bergerac (Rostand); in modern French Comedy course: Contes de Daudet (Cameron); in Modern French Prose course: Les Travailleurs de la Mer (Hugo) in consideration of the Romantic School, and Taine's La France Contemporaire, in Historical Prose course.

1. (2) ELEMENTARY FRENCH. Rudiments of grammar; careful drill in pronunciation, repetition and memorizing of easy expressions, reading of anecdotes and short easy selections. Fraser and Squair's French Grammar. *Autumn Quarter.*

2. (2) ELEMENTARY FRENCH. Grammar continued; drill on pronunciation; exercises, both English-French and French-English, designed to fix in memory the forms and principles of grammar. *Winter Quarter.*

3. (2) ELEMENTARY FRENCH. Grammar; special attention given to irregular verbs and idioms; frequent conversational exercises; Grandgent's French composition based on La Dernière Classe (Daudet); Sans Famille (Malot). *Spring Quarter.*

4. (2) MODERN SHORT STORIES. Reading, Le Tour de la France (Bruno); Colomba (Mérimée); Le Pays de France (Foncin); Contes biographiques (Foa); Le Roi de Montagnes (About); François, French Composition; exercises, written and oral. Conversation based on text read; drill in verb forms and idioms. *Autumn Quarter.*

5. (2) HISTORICAL PROSE. Reading, Jeanne d'Arc (Lamartine); Histoire d'un Paysan (Erkmann et Chatrian); Le Siège de Paris (Sarcey); François' Composition continued; frequent abstracts, sometimes oral and sometimes written, of portions of texts already read. *Winter Quarter.*

6. (2) MODERN FRENCH COMEDIES. Reading, Moi (Labiche et Martin); Le Luthier de Crémone, Le Tresor (Coppée); Mlle. de la Seiglière (Sandeau); dictations; frequent résumés of texts read; continued drill on idioms, and constant application in the construction of sentences. *Spring Quarter.*

7. (2) Consideration of the Romantic School with special study of VICTOR HUGO. Reading, Quatrevingt-treize; Hernani and La Chute; prose composition, Grandgent's French Composition, Part V; letters, business and friendly. Constant practice in speaking French. *Autumn Quarter.*

8. (2) MOLIÈRE. A careful study of his chief comedies and a survey of his art and ideas. Reading, L'Arave, Le Bourgeois Gentilhomme, Les Précieuses Ridicules; dictation; abstracts or reproductions from memory of selected portions of the matter read. Prose, Grandgent's Composition, Part IV; historical narration. *Winter Quarter.*

9. (2) THE CLASSIC DRAMA. Corneille, Racine. Reading, Le Cid, Polyeute (Corneille); Athalie, Andromaque (Racine). Dictation. Constant practice in giving French paraphrases of portions of texts read. Duval's Histoire de la Litterature Française is used throughout the year for the study of literature. *Spring Quarter.*

9a. (2) SCIENTIFIC FRENCH. This course is co-ordinate with French 9 in the literary course. Scientific readers and periodicals. Prose based on texts read. *Spring Quarter.*

10. (3) ADVANCED PROSE COMPOSITION AND CONVERSATION, based on practical subjects. Traveling; At the Custom House; At the Station; The Parisian; The Hotel; The Pension; General Description of Paris; The Chamber of Representatives, etc. Prerequisites, 1-9. *Autumn Quarter.*

11. (3) GREAT WRITERS OF THE CLASSICAL PERIOD. Pascal, Bossuet, Mme. de Sévigné, Saint Simon, Boileau, Fénélon. Themes in French. *Winter Quarter.*

12. (3) CRITICAL PROSE OF THE NINETEENTH CENTURY. Sainte-Beuve, Taine, Brunetière. Themes in French. *Spring Quarter.*

Spanish.

Spanish is offered as an elective for advanced students in French and for others who may desire a practical knowledge of the language for business purposes.

1. (2) ELEMENTARY SPANISH. De Torm's Grammar; all exercises written and reviewed orally. Appleton's Readers. Dictation and conversation. *Autumn Quarter.*

2. (2) ELEMENTARY SPANISH. De Torm's Grammar. El Capitan Veneno (Alarcon). Essays, oral and written. Commercial letters. *Winter Quarter.*

3. (2) MARIANELA (GALDOS). Sight reading. Comparative L[illegible]
erature. *Spring Quart[illegible]*

Domestic Economy.

The attention of students who are preparing to teach domestic economy is called to the Suggestive Curriculum on page 28. Such a curriculum is also a good preparation for the professional study of nursing and medicine.

1. (2) COOKERY. This course is designed for the younger pupils. It includes six hours a week of practical cooking, and four hours of elementary work in fuels, lighting, cleaning, the care of the house, and the composition of a few simple foods. *Autumn and Spring Quarters.*

2. (2) COOKERY. A continuation of course 1.
Winter and Spring Quarters.

A. (2) SEWING. Practice in hand sewing. Talks on materials used. Cutting and making of plain garments. Ten hours a week.
Autumn Quarter.

B, C. (4) SEWING. Machine sewing. Cutting and fitting of plain dresses. Use of patterns. Basketry. Ten hours a week.
Winter and Spring Quarters.

4. (1) HOUSEKEEPERS' COURSE IN COOKING. This course consists of practical work in the preparation of common dishes, with the study of the food principles and the effect of heat upon each. It is designed to meet the needs of housekeepers rather than of young students. Two periods a week of two hours each. *Every Quarter.*

5. (1) HOUSEKEEPERS' COURSE IN COOKING. A continuation of course 4. Instruction is given in the preparation of more elaborate dishes and in serving. Two periods a week of two hours each.
Winter and Spring Quarters.

6. (2) DOMESTIC ECONOMY. Practical work in cooking four hours a week. Lectures on sanitation three hours a week.
Autumn Quarter.

7. (2) DOMESTIC ECONOMY. This course continues the practical work of Course 6, with lectures on fuels, lighting, cleaning, and laundry work. *Winter Quarter.*

8. (2) DOMESTIC ECONOMY. Work in large recipes. A chafing dish course. Invalid cookery. A study of the composition of foods and dietary work. *Spring Quarter.*

Courses 6, 7, and 8 are designed for those who are preparing to teach, and for others who wish instruction in advance of that given in preceding courses.

Free-Hand Drawing.

In the work laid out for free-hand drawing, course 1 is intended to be of general educational value, and a foundation for other work in drawing.

In 2, 3, and 4 students will have an opportunity to carry on the work in drawing with greater liberty in the choice of mediums. It is planned to have this work prepare the student for advanced work in the study of art in art schools.

1. (2) FREE-HAND DRAWING. Drawing in charcoal from geometric solids, introducing fundamental principles of perspective, and light and shade. Charcoal from casts of features, hands, feet, heads, and historic ornament. One day in the week will be devoted to sketching in pencil and to a brief study of art history.

2. (2) FREE-HAND DRAWING. Charcoal from casts. Studies from still life in pen and ink, and wash. Elementary designing.

3. (2) FREE-HAND DRAWING. Water color, pen and ink, wash from still life. Advanced charcoal work.

4. (2) COLORING AND MODELING. Oil or water color, pen, wash, clay modeling, and charcoal.

Physical Culture.

BOYS' DEPARTMENT.

The method of instruction pursued is not limited to any one system. Proper recognition is given to any method the whole or parts of which have been found useful, or which indicate efficacy. Consideration is given to hereditary tendencies, and to individuality, in physical possibilities, physical condition, and physical tastes. Individual training, therefore, is encouraged in every case, and especially where an examination discloses a student's inability to pursue general or concerted exercises, either from threatened injury or inability to profit by such work.

Students, upon entering the Institute, are entitled, without cost, to a thorough physical examination. The examination includes accurate measurements of the physical proportions, a careful examination of the heart, lungs, and spine, and the strength of the principal groups of muscles; at the same time, information is solicited concerning heredity.

In every case where a defect is found in the boy's heart or lungs, he is advised to consult a physician, as the presence only, and not the degree of the defect, is determined. Upon the basis of the information so gathered, instruction is given as to particular exercises and the use of various developing apparatus.

In addition to individual work, daily classes are given (commencing immediately after Thanksgiving Recess and continuing to the Easter

Recess) in hygienic, educative, corrective, competitive, and recreative gymnastics, adapted as nearly as possible to the needs of individuals of all ages and physical conditions. The exercises so given are carefully graded as to progression, physiological effects, mechanical difficulty, and the boy's power of correct muscular co-ordination.

The boys' gymnasium contains a spacious exercise hall (90x40 feet), equipped with the most approved developing appliances, as well as apparatus for light and heavy gymnastics, hand-ball and basket-ball courts, shower and sponge baths, locker rooms and lockers, lavatories, visitors' gallery, and Instructor's office.

The gymnasium is open from 12 m. to 7 p. m., every school day. Attendance is voluntary and free of cost to all. Classes are arranged at such hours as not to conflict with other school duties.

ATHLETICS.

During the Autumn and Spring Quarters out-of-door athletic games and sports are practiced under the personal supervision of the Instructor in Physical Culture. Only such games and sports are encouraged as the location, character, and athletic equipment of the school make it desirable and possible to pursue.

Students are not permitted to compete on athletic teams without first passing a satisfactory physical examination.

PHYSICAL CULTURE FOR GIRLS.

The Swedish system of gymnastics will form the basis for the year's work. This system is scientific, progressive, and rational, and its methods are safe and effective. The movements are cumulative, producing related effects, which manifest themselves in a better physique and in a better basis for higher moral and intellectual life.

The first half of the year's work will consist of free-floor exercises (without apparatus), fancy marching and drills, competitive and recreative games.

The second half will consist of advanced floor work, together with apparatus work on the Swedish boom, wall-bars and stools, walking-beams, rope, horizontal and serpentine ladders.

Physical examinations will be given and prescription cards for diet and exercise will be issued according to individual needs.

The work is educative, hygienic, and recreative. It cultivates an erect carriage, corrects spinal curvature and faulty habits of standing, sitting, and walking, improves the circulation and respiration, gives strength and self-control, secures mental relaxation and proportional body development.

Brief talks on "First Aid to Injured," and Hygiene, with its attendant subjects, will be given during the year.

The School of Engineering.

Students are admitted to the School of Engineering on the same conditions as to the School of Arts. Graduates of Chicago high schools and other schools of equal rank are given credit for so much of the work, outlined in the curricula, as they have mastered, which should be sufficient to enable them to complete the courses of instruction leading to the degree of Mechanical Engineer in four years.

The School of Engineering limits its work to what may be called the mechanical engineering subjects proper, namely, drawing and designing, shop practice, applied mathematics, steam and electricity, with such electives in the last two years as enable the student to specialize in shop, steam, electrical, or chemical engineering. Instruction in mathematics, physics, chemistry, history, English, and modern languages is given in the School of Arts.

Two curricula are outlined on pages 58 and 59, an Eight-Year Curriculum and a Seven-Year Curriculum, the latter indicating the minimum requirements for the degree. The basis of successful engineering study must be broad and solid, and candidates for the degree are encouraged to secure as complete a general education as time and means permit.

It is the purpose of the Institute to do as much as possible for every individual student, considering the time and money at his command. The greatest service it can render the man of small means is to save his time without sacrificing educational essentials. By careful correlation of work and by methods of individual instruction the Institute has been fortunate in accomplishing this end. Students of good ability entering at the age of fourteen have been graduated at twenty-one. This is a saving of at least two years over customary curricula. It is accomplished by having the student in one atmosphere for the seven most important years of his intellectual life.

EIGHT-YEAR CURRICULUM FOR DEGREE OF M. E.

Year.	Autumn Quarter.	Course No.	No. of Credits.	Hours in Class.	Winter Quarter.	Course No.	No. of Credits.	Hours in Class.	Spring Quarter.	Course No.
First.	English	1	2	1	English	2	2	1	English	3
	Mathematics	1	2	2	Mathematics	2	2	1	Mathematics	3
	Latin	1	2	1	Latin	2	2	2	Latin	3
	Sketching	1	2	2	Woodwork	2	2	2	Drawing	5
	Total	....	8	6		....	8	6		....
Second.	English	4	2	1	English	5	2	1	English	6
	Mathematics	4	2	1	Mathematics	5	2	1	Mathematics	6
	Latin	4	2	1	Latin	5	2	1	Latin	6
	Forge	3	2	2	Foundry	4	2	2	Drawing	6
	Total	....	8	5		....	8	5		....
Third.	Mathematics	12	3	1	History	4	3	1	History	7
	Physics	1	3	3	Physics	2	3	3	Physics	3
	German	1½	3	1	German	3	3	1	German	4½
	Total	....	9	5		....	9	5		....
Fourth.	English	7	3	1	English	8	3	1	Mathematics	10
	Chemistry	1	3	3	Chemistry	2	3	3	Chemistry	3
	German	6	3	1	German	7½	3	1	German	9
	Total	....	9	5		....	9	5		....
Fifth.	Mathematics	13	3	1	Mathematics	14	3	1	Mathematics	15
	French or Spanish	1	2	1	French or Spanish	2	2	1	French or Spanish	3
	Drawing	10	2	2	Drawing	12	2	2	Drawing	11
	Machine Shop	19	2	2	Pattern Shop	7	2	2	Pattern Shop	8
	Total	....	9	6		....	9	6		....
Sixth.	Physics	4	3	3	Physics	5	3	3	Physics	6
	Mathematics	16	3	1	Mathematics	17	3	1	Mathematics	18
	Descriptive Geom.	25	2	2	Kinematics	28	2	2	Eng'g Laboratory	15
	Machine Shop	20	2	2	Machine Shop	22	2	2	Machine Shop	23
	Total	....	10	8		....	10	8		....
Seventh.*	Statics	16	3	1	Dynamics	17	3	1	Strength of Materials.	18
	Thermodynamics	43	3	1	Eng'g Laboratory	48	2	2	Testing Machines	46
	Chemistry	4	3	3	Chemistry	5	3	3	Chemistry	6
		....	....	...	Forge	21	2	2	Foundry	9
	Total	....	9	5		....	10	8		....
Eighth.*	Thesis	51	1	0	Thesis	51	3	2	Thesis	51
	Machine Design	27	2	2	Hydraulic Mach'n'y	47	2	2	Specifications and Contracts	50
	Hydraulics	42	2	1	Structural Design	33	3	2		
	Chemistry	9	4	4	Chemistry	10	2	2	Chemistry	11
	Total	....	9	7		....	10	8		....

* For the last two years, the Sixth and Seventh years of the Seven-Year Curriculum may be substit

SEVEN-YEAR CURRICULUM FOR DEGREE OF M. E.

AUTUMN QUARTER	Course No.	No. of Credits.	Hours in Class.	WINTER QUARTER	Course No.	No. of Credits.	Hours in Class.	SPRING QUARTER.	Course No.	No. of Credits.	Hours in Class.
ish	1	2	1	English	2	2	1	English	3	2	1
ematics	1	2	2	Mathematics	2	2	2	Mathematics	3	2	2
an	1	2	1	German	2	2	1	German	3	2	1
dwork	2	2	2	Sketching	1	2	2	Drawing	5	2	2
tal	..	8	6		..	8	6		..	8	6
ish	4	2	1	English	5	2	1	English	6	2	1
ematics	4	2	1	Mathematics	5	2	1	Mathematics	6	2	1
an	4	2	1	German	5	2	1	German	6	2	1
ing	6	2	2	Foundry	4	2	2	Forge	3	2	2
tal	..	8	5		..	8	5		..	8	5
ish	7	3	1	English	8	3	1	History	7	3	1
ematics	12	3	1	History	4	3	1	Mathematics	10	3	1
ics	1	3	3	Physics	2	3	3	Physics	3	3	3
ine Shop	19	2	2	Drawing	10	2	2	Pattern Shop	7	2	2
tal	..	11	7		..	11	7		..	11	7
ematics	13	3	1	Mathematics	14	3	1	Mathematics	15	3	1
nistry	1	3	3	Chemistry	2	3	3	Chemistry	3	3	3
an, or	7	2	1	German or	8	2	1	German or	9	2	1
ch or Spanish	1	..	..	French or Spanish	2	..	..	French or Spanish	3	..	..
rn Shop	8	2	2	Drawing	12	2	2	Drawing	11	2	2
tal	..	10	7		..	10	7		..	10	7
ematics	16	3	1	Mathematics	17	3	1	Mathematics	18	3	1
ics	4	3	3	Physics	5	3	3	Physics	6	3	3
riptive Geom.	25	2	2	Kinematics	28	2	2	Eng'g Laboratory	15	2	2
ine Shop	20	2	2	Machine Shop	22	2	2	Machine Shop	23	2	2
tal	..	10	8		..	10	8		..	10	8
s	16	3	1	Dynamics	17	3	1	Strength of Materials.	18	3	1
modynamics	43	3	1	Eng'g Laboratory	48	2	2	Testing Machines	46	2	2
Gears	31	2	2	Direct Current M'ch'y	37	2	2	Altern.Current M'ch'y	38	2	2
e	21	2	2	Steam Engine Design	32	2	2	Foundry	9	2	2
tal	..	10	6		..	9	7		..	9	7
is	51	1	0	Thesis	51	3	2	Thesis	51	5	3
ine Design	27	2	2	Hydraulic M'ch'y	47	2	2	Specifications and Contracts	50	1	1
aulics	42	2	1	Structural Design	33	3	2				
rical Lab'y	35	3	3	Engine Tests	45	2	2	Power Plant Tests	49	3	3
tal	..	8	6		..	10	8		..	9	7

he last two years, the Seventh and Eighth Years of the Eight-Year Curriculum may be substituted s who wish to specialize in Chemical Engineering.

Courses of Instruction in the School of Engineering.

Engineering.

The work classified under this head embraces applied mathematics, applied electricity, testing of machinery and instruments, drawing and designing, shop practice, and machine construction.

The aim is to present these subjects in such order and comprehensiveness as to meet the requirements of those who complete the courses and those who do not, enabling some to throw their entire energy into professional studies and others to receive the fundamental instruction necessary for practical work on leaving the Institute.

While the work outlined has direct bearing on the training of the mechanical engineer, the student who expects to follow any branch of engineering or architecture will find much that will be of service in his subsequent work.

The location of the Institute allows advantage to be taken of extensive and varied manufacturing establishments, and throughout the four years there will be required of each student in the Engineering Courses monthly visits of inspection, under the direction of an instructor, to some shop where notes and sketches will be made. These trips will usually be made on Saturdays. A familiarity with constructive work on a scale and variety impossible in one shop will thus be obtained.

In the shops and in the drawing rooms of the Institute, methods and principles will be presented, when possible, by exercises of ultimate value as parts of machines or apparatus.

In shop and drawing room and laboratory work, time cards are made out daily by each student, stating the character of work done, materials, number of machine, and drawings used. These are kept on file and transferred at the end of each six weeks to sheets, showing at a glance the variety of work performed, hours on different machines, etc.

1. (2) Freehand Sketching. This course is designed to enable the student to work in perspective and simple projection. Sketches from memory and description will be a prominent feature of the work.

Every Quarter.

2. (2) Wood Work. Uses and care of tools. Exercises in sawing,

planing and laying out work. Application of the ordinary carpenter's and joiner's tools, such as saws, bench, rabbeting and moulding-planes, chisels, gouges, brace and bits, hammer, square, bevel, etc., in the construction of the principal joints used in carpentry and joinery. Center, face plate, screw and hollow chuck, and templet turning. Distinguishing characteristics of the various kinds of wood in ordinary use and the methods of finishing. *Every Quarter.*

2a. (2) WOOD WORK (*Advanced course*). This course affords those who have gained some facility in the handling of carpenters' tools further practice in their use, and also an opportunity to do more advanced work. Applications of the principles given in course 2 to methods of laying out and constructing frames of buildings, roofs, roof trusses, bridges, etc., doors, door frames, window sash and frames, stairs and stair railing, and various forms of apparatus for chemical, physical and engineering laboratories.

3. (2) FORGE WORK. Management of fire. Practice in drawing out, upsetting, bending, forming, fullering, swaging, punching, and welding of iron and mild steel. Tool-steel working, hardening and tempering. Illustrations of the effect of differences in the composition of iron and steel upon their mechanical properties, and the method of treating the different cases. *Every Quarter.*

4. (2) FOUNDRY WORK. Preparing and mixing sand and facings, bench and floor mouldings of ordinary patterns; match plate work, making sand and plaster follow boards; making, baking, and setting cores; crucible melting; management of furnace, preparing charges of iron and brass; cleaning, lining, and charging cupola; melting, skimming, pouring, cleaning, and tumbling castings. *Every Quarter.*

5 (2) INSTRUMENTAL DRAWING. This is the first work with drawing instruments and has for its aim the proper handling of instruments and some facility in line work. Especial attention is paid to accuracy of construction. *Every Quarter.*

6. (2) PROJECTION DRAWING. The knowledge and use of planes of projection are taught in this course. In view of the use to which it may be later applied, the third angle will be used for most projections. *Every Quarter.*

7. (2) PATTERN-MAKING. Practice in the use of general wood-working machines, such as the surface planer, joiner, circular and band saws, lathe, trimmers, shoot-board, and the ordinary hand tools; in the preparation, cutting, fitting and gluing of stock used in the making of patterns, and the necessary core-boxes of angle and surface plates, collars, flanges, pipe fittings, valves, pulley rings, hand wheels, etc. *Every Quarter.*

8. (2) PATTERN-MAKING (*Advanced course*). Application of the methods of the preceding course to the making of patterns for general

machine work, including hangers, journal boxes, pulleys, sheaves, spur, bevel, and worm gears, machine details, engine frames, cylinders, valves, etc., match plates, follow boards, sweeps for loam work, skeleton core-boxes, and patterns.

9. (2) FOUNDRY WORK (*Advanced course*). Floor moulding, including patterns of complicated form requiring the use of drawbacks, anchor plates, cheeks, etc.; dry sand, loam, and pit moulding, sweep work, and green sand core making. Mechanical properties of the different grades of pig iron and their mixtures.

10. (2) MECHANICAL DRAWING. Lettering and conventional representation of frequently recurring parts of machines, such as nuts, threads, fastenings, etc. This course is designed to establish standard methods of lettering, dimensioning, and conventional representations.

10a. (2) MECHANICAL DRAWING. Continuation of course 10.

11. (2) MACHINE SKETCHING AND DIMENSIONING. Sketches of complete machines and of detailed parts made in perspective and projection, the dimensions being supplied from carefully made measurements. Students who have taken this course should be able to make a clear and neat working sketch with the dimensions properly placed.

12. (2) WORKING DRAWINGS FROM SKETCHES. The making of finished working drawings from sketches made in the preceding course. This course is designed to teach certain well established modes in use by designers of machinery. All drawings are made in pencil, and some are afterward traced on cloth. *Spring Quarter.*

15. (2) ENGINEERING LABORATORY. Such work with engines, boilers, generators, motors, dynamometers, and testing machines as is needed to give the student that familiarity with them requisite to the intelligent study of electrodynamics, thermodynamics, mechanics, and machine design. *Spring Quarter.*

16. (3) STATICS. Composition and equilibrium of concurrent forces; parallel forces and center of gravity; couples and composition and equilibrium of non-concurrent forces; suspended weights and catenary. *Autumn Quarter.*

17. (3) DYNAMICS. Uniform motion, falling bodies, Newton's laws, and mass; accelerated motion; impact; virtual velocities, moment of inertia; work, energy, power; friction. *Winter Quarter.*

18. (3) STRENGTH OF MATERIALS. Elementary stresses and strains, tension, compression, shearing, and torsion; flexure of beams; continuous girders; flexure of long columns. *Spring Quarter.*

19. (2) BENCH METAL WORK. Clipping, filing, and polishing of cast and wrought iron and steel; laying out work, drilling, tapping, reaming, scraping flat surfaces to surface plate. Illustration and designation of the different shapes and cuts of files and the uses to which they are adapted.

20. (2) MACHINE TOOL WORK. Explanation of the construction of the different forms of machine tools; directions for operating and keeping tools in order. Practice in centering, plain, taper, and templet turning, chucking, drilling, boring, external and internal thread cutting; hand tool turning, filing, polishing; planing, shaping, plain milling; forms of cutting tools and instructions in grinding.

21. (2) FORGE WORK (*Advanced course*). Tool dressing, hardening, and tempering in open fire, lead, sand bath, and oil; case-hardening; annealing; steam hammer work, faggot-welding, engine and machine forgings.

22. (2) TOOL AND SCREW MAKING. Use of the lathe, drill press, planer, shaper, universal miller, universal grinders, hand tools, standard gauges, micronometer, and vernier calipers, in construction of accurate reamers, taps, dies, and straight, spiral, angular, side, end, and formed milling cutters, etc. Setting up and operating screw machine; making machine screws, nuts, studs, and formed work.

23. (2) MACHINE TOOL WORK (*Advanced course*). Continued practice in the use of machine tools in the boring, turning, sizing, and cutting of spur, bevel, and spiral gears; worms and worm wheels. Planing, milling, scraping, fitting, and finishing the sliding surfaces and parts of machines.

24. (2) MACHINE ERECTING. Practice in assembling, erecting, finishing, fitting, and adjusting complete machines.

25. (2) DESCRIPTIVE GEOMETRY. Graphical methods of solving problems of intersections of lines, planes, surfaces, and solids, and developed shapes. Practical problems designed to secure facility in the application of principles.

26. (2) DESCRIPTIVE GEOMETRY AND MECHANICAL PERSPECTIVE. This course is a continuation of the preceding and extends into mechanical perspective. The laws of perspective are studied and their application made in producing simple perspective drawings from projections.

27. (2) MACHINE DRAWING. With the aid of handbooks of data and formulas, the use of which is encouraged in previous courses, this course will call for designs reproduced from cuts and photographs.

28. (2) ELEMENTS OF MECHANISMS. The study of elementary combinations, pulleys, and belts, gearing, etc.

29. (2) PRACTICAL KINEMATIC PROBLEMS. A study of the laws of motion, linkages, trains of gearing, and problems in the determination of combinations necessary to secure required motions.

30. (2) SPECIAL MACHINERY DESIGN. The design of some machine which will exhibit the observational, inventive, and analytical ability of the student is undertaken in this course. Students must have completed the courses in engineering and physics outlined in the curricula leading to the degree of M. E. before taking this course.

31. (2) VALVE GEAR DESIGN. The familiarity of the student with kinematics, and his previous practice in drawing are made use of in this course in the investigation of various valve gear motions, and applied to problems in actual designing.

32. (2) STEAM ENGINE DESIGN. A study of the fundamental problems of steam engine design, such as the influence of the weight of reciprocating parts on steady running, etc. A theoretical design will be undertaken and compared with the practice of leading builders.

33. (3) STRUCTURAL STEEL WORK. The study of trusses, plate girders, and detail used in building frames, bridges, roofs, and cranes. The subject of specifications according to current practice will be carefully considered.

34. (2) THEORY OF ELECTRODYNAMIC MACHINERY. A course of lectures dealing with the elements of dynamo machinery and laboratory practice in its use for lighting and power.

35. (3) CONSTRUCTION AND TESTING OF DIRECT CURRENT MACHINERY. Lectures and laboratory practice in direct current dynamo testing, including the theory and use of instruments.

36. (2) CONSTRUCTION AND TESTING OF ALTERNATING CURRENT MACHINERY. Lectures and Laboratory practice in alternate current machinery testing.

37. (2) DESIGN OF ELECTROMAGNETS AND DIRECT CURRENT MACHINERY. A course in mechanical, magnetic, and electrical calculations for special machinery with practice in construction and tests of design in laboratory.

38. (2) DESIGN OF ALTERNATING CURRENT MACHINERY AND APPLIANCES. Complete calculations for alternators and transformers with practice in construction and tests of original and commercial machinery.

39. (2) ELECTRIC TRANSMISSION. Theory of electric transmission; insulation and insulators; measurement of insulation resistance; location of faults.

40. (2) PROBLEMS IN ELECTRIC TRANSMISSION. Direct current, single phase, and polyphase; methods of distribution as applied to electric lighting and transmission of power; effects of the different methods on first cost and operating expenses.

41. (2) THE TELEGRAPH, TELEPHONE, AND ELECTRIC SIGNALING. Theory and practice.

42. (2) HYDRAULICS. The law governing fluids in motion, flow of water through orifices and pipe, losses of head by friction; hydraulic motors and their efficiencies.

43. (3) THERMODYNAMICS. Mechanical theory of heat; laws of thermodynamics as applied to heat engines and refrigerating machines; analysis of the action of injectors and other steam apparatus.

44. (2) STEAM BOILERS. The various forms and peculiarities of modern boilers, the proportion of heating surface, grate areas, and chimney capacity, as related to the best performance under various conditions; the various apparatus related to boilers.

45. (2) LABORATORY ENGINE TESTS. Calorimeter tests for determining the quality of steam; boiler efficiency tests; similar tests of steam and power pumps under various conditons, such as are likely to occur in practice.

46. (2) TESTING MACHINERY PRACTICE. Tests of materials of construction; determining the elastic limit and ultimate strength under tension, compression and torsion.

47. (2) HYDRAULIC MACHINERY TESTS. Hydraulic experiments in the flow of water through pipes and orifices; pumps of various kinds tsted for the duty performed under known conditions of power furnished by steam or mechanically transmitted power.

48. (2) POWER MEASUREMENT TESTS. Measurement of power by rope, hydraulic, and Prony brakes; use of Morin, Weber, cradle, floating, and other forms of transmitting dynamometers.

49. (3) POWER PLANT TESTS. Complete tests of power plants from the weighing of the coal to the worked up reports of condition, arrangement, and general efficiency of boilers, engines, generators, and motors.

50. (1) SPECIFICATIONS AND CONTRACTS. Commercial specifications and contracts, such as the engineer is likely to require a general knowledge of, are treated in a regular course of lectures supplemented with occasional addresses by men who have given extensive study to special phases of the subject.

51. (9) THESIS. Each candidate for degree of mechanical engineer is required to present a thesis on some engineering subject which he has investigated during his senior year. In this work he is thrown largely on his own responsibility, and must present a thesis showing capacity for careful observation, invention, and deduction. The subject should be chosen before the close of the junior year and submitted to the head of the department for approval. In the autumn quarter one hour a day is devoted to the literature on the subject, in the winter three hours a day to preparing apparatus and preliminary experiments, and in the spring five hours a day to completing the investigation and writing results. Frequent consultations with the instructor in whose field the subject is chosen and a written weekly report of progress is required. The thesis shall be typewritten, of standard dimensions and binding, and deposited in the library before graduation.

Special Evening Courses.

I. Engineering Principles and Practical Mathematics.—One hour each evening given to lecture and one hour to solution of problems. This course is intended to meet the need of students, mechanics, electricians, and all artisans who wish to obtain the basis for a reading knowledge of the fundamental principles common to the Mechanical Engineering branches. Great care is taken to present the topics in a clear, concise way in the simplest possible language.

VI. Engineering Mathematics.—Algebra, Geometry, Trigonometry, and Graphical Calculus applied to Engineering Problems. The prerequisite is course I, practical mathematics, or its equivalent. This course is undertaken with the purpose of carrying the student further in mathematics, and the applications of mathematics to engineering problems. Much attention is given to graphical processes—their use in the study of forces, velocities, solution of equations, interpolation, mensuration, etc.

This course is planned to be of value to those who, in design, operation, or test, find that simple mathematical and graphical work gives them trouble.

VII. Strength of Materials and Statics.—The work is of both the class room and drawing room kind and treats the following subjects: Matter, force, equilibrium; representing a force; parallelogram, triangle and polygon of forces; parallel forces; moments, conditions for equilibrium of moments; center of gravity; moment of intertia, radius of gyration; stress and strain, modulus of elasticity; slope and deflection; limit of elasticity, ultimate resistance, modulus or rupture. The stresses in simple trusses and framed structures are studied.

VIII. Structural Steel Work. This course gives the student who has completed course VII. a drill in the principles there acquired. By the study of current practice as displayed in specifications and designs, and the employment of his previous study he is enabled to undertake and complete satisfactorily in this course designs of plate and lattice girders, trusses, etc.

Courses VII. and VIII., each of twenty weeks duration, are planned to assist engineers, draftsmen, foremen, machinists, and others who are engaged in structural steel work and allied occupations.

XIII. Electrical Engineering Laboratory. This course embodies the study of the following subjects with demonstration by the student: Construction and use of Wheatstone bridge; electrical energy lost in heat in incandescent lamp; determination of mean vertical, horizontal, and spherical candle power of incandescent lamp; proper rating and lamp target for incandescent lamp; efficiency and life determination of

primary batteries; test of storage battery; resistance and ground by voltmeter method; construction and use of tangent galvanometer; curves and constants for Siemen's dynamometer; conductivity tests of commercial copper; commercial efficiency of a D. C. motor; magnetic leakage of a dynamo; dynamo characteristics; electrical efficiency of D. C. arc lamps.

XIV. Alternating Current Machinery.—This course is arranged to meet the need of electrical artisans and technical school graduates. Among the subjects treated are : Alternating waves; resistance, reactance, and condensance, separately and in combination; power factor; vector method of representing alternating waves; single phase and polyphase transmission lines; single phase and polyphase induction motors; synchronous motors; rotary converters and transformers; transformer testing; two phase to three phase transformation; M-phase to N-phase transformation; metering of polyphase systems.

XV. Steam Engineering Laboratory.—The following are among the subjects treated in this course: determination of strengths of materials; determination of stress and strain in a bridge truss; efficiency of simple machines; rope and chain tackle, test of a centrifugal machine, prony friction brake, cradle dynamometer test for an electric motor, work and efficiency of a hydraulic ram; calculation of power; gas engine and calculation of power; calculation of condenser capacity; calculation of boiler capacity; calculation of pump capacity; calculation of ice machine capacity; taking indicator cards and calculating H. P.; boiler trial; engine friction and steam used; gas engine, trial and gas used per H. P.; various forms of prony brake; efficiency tests of injectors; calibration of steam gages and thermometers; tests of steam pumps.

XVII. Modern Gas Practice.—This course is presented to supply a demand on the part of engineers and employees of gas companies for information relating to modern gas manufacture, gas as a motive power, its relation to electric power station, and gas plants in general. The subject will include the discussion of site, machinery, design, cost, estimate, and operation of some of the following: Sulphate of ammonia plant, tar gas plant, water gas plant, combination tar and water gas plant, and central power station operated by gas.

XVIII. Street Railway Practice.—The first hour is devoted to elementary applications of Ohm's Law, practical measurements of current, resistance; drop, and power expended in series and multiple circuits; theory and types of D. C. generators and motors; problems in simple circuits.

The second hour is given to descriptions of street railway apparatus and its use; calculations of the feeder system; cost of overhead and track construction; resistance and carrying capacity of return circuits;

car equipment—body and trucks; friction; air and electric brakes; heating and lighting circuits of car; the street railway motor—armature fields, and general connections; the series parallel controller; motor troubles; draw bar pull, traction coefficients, grades and curves; tests of cars for current consumption and speed; the street railway generator, power-house switchboards, measuring instruments, etc.; steam plant machinery; electrolysis—tests and prevention; third rail, conduit, electro-magnetic, and surface contact systems.

Several evenings will be devoted to visits to street railway plants, repair shops, etc.

XIX. ARCHITECTURAL SCULPTURE.—Architectural or ornamental sculpture, often called decorative modelling, is extensively used in all our large cities in making the original patterns and raised or relief designs for decoration plaster and papier mache, for friezes, ceilings, centers, capitals, etc. In iron, brass, and bronze foundries it is used in the models and patterns of nearly all ornamental castings which have raised ornamentation, including silver work. Modelling is employed also by pottery and tile makers as well as in many other industries.

The study required in this class is that of modelling ornamental details of architecture and their application to different purposes. The different styles and treatment of ornament and the practical methods of modelling for different industries. The proper manipulation and use of clay and a thorough understanding of design; relative proportions and symmetry of construction. The purpose is to develop both the artistic and the practical, and to give the student a clear comprehension of his work both in theory and practice, and to develop his skill sufficiently to enable him to enter any shop or factory on the merit of his work.

University Extension Lectures

In 1902-03 the following lectures were given at the Institute on Thursday evenings. The average attendance was 150.

I. *The Earth As It Is.* A course of twelve lectures on Physiography, illustrated with stereopticon, by ROLLIN D. SALISBURY, A.M., Professor of Geographic Geology, University of Chicago, October 2 to December 18.

1. The Earth's Beginnings. 2. The Early Eras of the Earth's History—the Eozoic and Proterozoic Eras. 3. The Early Paleozoic Periods—the Cambrian, the Ordovician, and the Silurian. 4. The Later Paleozoic Periods—the Devonian, Carboniferous and Permian. 5. The Mesozoic Era. 6. The Cenozoic Era. 7. (*a*) The Great Physiographic Divisions of the Earth. (*b*) The Processes of Change in the Earth's Surface—Disastrophism, Vulcanism, and Gradation, and their Functions. 8. The Work of Rivers. 9. The Work of Lakes and Seas. 10. The Work of Ice. 11. Volcanoes and Vulcanism. 12. The History of Mountains, Plateaus, and Plains.

II. *The Spiritual Element in Tragedy,* by S. H. CLARK, Ph.B., Associate Professor of Public Speaking, University of Chicago. January 8 to February 12.

1. The Tragic Ideal. 2. Macbeth—A Tragedy of the Will. 3. Richard III. 4. King Lear—A Tragedy of Filial Love. 5. Julius Cæsar—A Tragedy of the Idealist. 6. Henry V—The Poet's Hero King.

III. *Plain Talks on American History,* by EDWIN ERLE SPARKS, Ph.D., Associate Professor of American History, University of Chicago. February 19 to March 26.

1. The Birth of American Diplomacy. 2. The Separation of Church and State in America. 3. The Unfortunate Aftermath of the Revolution. 4. The Story of the Constitution. 5. The Westward Movement of the People. 6. The Tardy Evolution of American Unionism.

Announcements of courses of lectures for season of 1903-04 may be had on application.

Evening Session of 1903-4.

October 5 to May 20.

The session of 1903-04 opens October 5, and is divided into three terms of ten weeks each. The Institute is open four evenings a week. Some of the courses of instruction are given on Monday and Thursday evenings, others on Tuesday and Friday evenings. The courses are so arranged as to make it possible for a student to take one course and attend two evenings a week, or two courses and attend four evenings a week. The cost of tuition for one course of instruction, two evenings a week, for a term of ten weeks is five dollars; for two courses of instruction, four evenings a week, ten dollars.

Any course of instruction offered day students will be repeated at night if the demand is such as to justify the formation of a class. Provision has also been made for such instruction as will enable young men and women who are employed during the entire day to continue their education along those lines that will be of the most service to them in the work in which they are engaged.

The following Courses of Instruction were given during the session of 1902-1903:

Mechanical Drawing, Machine Sketching, Machine Design, Machine Shop Practice, Forge Practice and Tempering, Foundry and Cupola Practice, Pattern Making, Engineering Principles and Practical Mathematics, Laboratory Testing, Steam and Electrical Engineering Laboratory, Strength of Materials, Modern Gas Practice, Street Railway Practice, Alternating Current Machinery, Architectural Sculpture, Structural Steel Work, in the School of Engineering.

Chemistry, English Literature, English Composition, Latin, German, French, Spanish, Algebra, Geometry, Trigonometry, Arithmetic, English Grammar, Reading, Spelling, Composition, Penmanship, Accounting, Cooking, Physical Culture.

The attendance for the season of 1902-03 was 1,362.

Special Evening Circular may be had on application.

Summer Session of 1903.

July 6 to August 14.

Three quarters and a summer term of six weeks make a school year of forty-two weeks, leaving ten weeks for vacation.

The courses of instruction in the Institute are so arranged that pupils who attend the summer term may, to that extent, shorten the total time requirement. It is manifestly to the advantage of those who remain in the city to devote to study a part of the twelve weeks of the summer.

The summer term gives and opportunity for those who wish to supplement work done in other schools with such instruction in science and the practical arts as the laboratory and shop equipment of the Institute make it possible to offer.

The summer term enables pupils who have fallen behind in the work of the year to make up deficiencies. Review classes are formed covering the work of each year in the high school in English, history, mathematics, physics, chemistry, Latin, Greek, German, and French.

The arrangement of classes is such as to make it possible for a pupil to complete one or two courses of instruction in the term of six weeks. The usual hours are from eight to twelve in the forenoon.

Any course of instruction offered by the Institute will be repeated in the summer if the demand is such as to justify the formation of a class.

The cost of instruction for the summer term is five dollars for one course, and ten dollars for two courses of instruction.

In physics and in chemistry, one course counts as two courses, because of the extra laboratory requirements.

The attendance for the summer of 1902 was 242.

Special Summer Circular may be had on application.

Sixth Annual Commencement

June 18, 1903.

Degrees Conferred.

Mechanical Engineer.

SAMPSON ABRAHAMS
ALEXANDER DAVISON BAILEY
PAUL BONIFACE JUHNKE

Titles Conferred.

Associate in Science.

CRAIG BEEBE HAZELWOOD
J. NORMAN JENSEN
CORA JOAN KOHLSAAT
FRANK WINTHROP MERRILL
AGNES RUTH MILLER
LYDIA MOJONNIER
CATHERINE LOUISE PERLEY
ADA ELIZABETH ROADIFER
ROBERT HOLT SALISBURY
GERTRUDE CLARK SOBER
HARRY MONROE WHEATON
JOHN HOWARD WILLIAMS

Associate in Literature.

LELA ETHELYN BARNARD
CHARLES FRANK BEEZLEY, JR.
ZELLA SLATER BISSELL
LOUISE MARIE BRUNER
GILBERT HAVEN CADY
ELIZABETH CHAMBERLAIN
ZOURA LANE CLARK
MILDRED IRENE COLLINS
JULIA MARY DOYLE
MINNIE MABEL DUNWELL
MABEL FRANCES FORBES
EDWARD GANNON
MARJORIE ELIZABETH GRAFIUS
LOUISE HITCHCOCK
SHIRLEY STEVENS MCDONALD
DORIS MARY SCHAEFER
AGNES ALEXANDRIA SMYTH
ALDA MAY STEPHENS
FLORENCE STREET
BEATRICE LILLIAN SWENSON
ALICE SETON THOMPSON

Students in the School of Arts.

The names of students taking evening, summer, or special courses are not included in the following lists.

The figures after the names of students indicate the number of credits obtained at the end of the Winter Quarter, March 20, 1903, and completed without conditions, or credited to them on advanced standing. Students are classified as Associates, when they have received 144 credits, Candidates for Title of Associate, when they have 90 credits, and Candidates for Academic Certificate when they have less than 90 credits. For definition of credit, see page 26.

Graduate Students.

Babb, Bijou	A.B., University of Chicago
Sober, Gertrude C.	B.S., University of Michigan
Thayer, Belle R.	B.L., University of Michigan

Associates.

Andrus, Ethel P.	189	Erwin, Henry O.	153
Bendix, Charlotte I.	165	Kilner, Isabel	174
Bissell, Grace D.	171	Miner, Lewis S.	184
Dunn, Elizabeth	174	Robertson, Norman	179

Candidates for Title of Associate.

Albert, Charles	108	Brown, Hazel L.	114
Allis, William E.	108	Brown, James V.	132
Arnold, Sarah K.	102	Bruner, Louise	138
Banks, Harry P.	125	Bundy, Merle A.	114
Barnard, Lela E.	135	Burggraf, Julia	96
Berzley, Charles F. Jr.	135	Cady, Gilbert H.	146
Bell, Beatrice	99	Calhoun, Douglas	99
Bergstrom, Anna T.	108	Carey, Alice	108
Birkhoff, Louise M.	110	Carnes, Portia	108
Bissell, Zella S.	138	Carter, Allen J.	108
Bolger, T. Johnson	105	Chadwick, Ruth	110
Brabrook, J. Josephine	105	Chamberlain, Elizabeth	144
Branch, Stella B.	96	Clark, Zoura	135
Bristol, George H.	90	Clinnin, Josephine M.	114

Colby, Francesca B. 135
Collins, Mildred I. 141
Cotton, Martha A. 105
Cottrell, A. Louise 114
Craven, Edward 114
Crighton, Charles H. 98
Dieter, Charles 93
Dieter, Nellie 123
Doyle, James J. 108
Doyle, Julia M. 132
Dunwell, Minnie M. 135
Ellis, Gertrude 106
Flanagan, Laura 99
Forbes, Mabel 135
Frederickson, Fred'k O. 108
Gannon, Edward 144
Gaskins, Gertrude 105
Grafius, Marjorie 138
Greene, Myrtle 108
Gunthorp, Martha 105
Hall, Edith 114
Hazelwood, Craig B. 135
Hill, Irene E. 108
Hill, Laura W. 102
Hitchcock, Louise 135
Hoswell, Edith 102
Irion, Rudolph J. 104
Jacobson, Olga 108
Johnck, Marie 114
Kelly, Hazel D. 108
Kidder, Florence 96
Kilner, Louise M. 108
Kitch, Pearl 92
Kohlsaat, Cora J. 135
Lane, Harriet A. 95
Lawlor, Edwin D. 99
Lemon, Harvey B. 96
MacDonald, Shirley S. 135
MacLean, Belle 111
Mamer, Clio 108
Markey, Margaret 102
Marshall, George 102
Martin, Andrew 90
Mason, Lucile 102
McCasky, Grace 108
McMahon, Eva 111
Mead, Lewis F. 132
Miller, Agnes 135
Moerdyke, N. Perry 108
Mojonnier, Lydia 135
Moore, Grace E. 90
Morcomb, Margaret 114
Moulton, C. Robert 93
Nelson, Mathilda 108
Norris, Helen 102
Olson, Alice M. 99
Owen, Lettice W. 127
Perley, Catherine L. 135
Pusey, William C. 102
Raymond, Agnes 117
Roadifer, Ada E. 135
Robertson, Harriett L. 102
Roeschlaub, Marguerite 92
Roome, Elsie C. 105
Saal, Elsa 102
Salisbury, Robert H. 141
Samels, Claire 108
Schaefer, Doris M. 135
Scharfer, Fred R. 108
Scott, Donald 96
Scott, Mabel E. 106
Sethness, C. Henry 99
Smith, Imogene 108
Smyth, Agnes A. 135
Snow, Ava 96
Spray, Edith L. 96
Stephens, Alda M. 135
Stocking, Mary B. 108
Street, Florence 135
Summerhays, Bessie 102
Swenson, Beatrice L. 156
Talcott, Frances 90
Thompson, Alice S. 141
Titus, George S. 111
Tower, Rosamond M. 99
Vannata, Hattie C. 108
Wakefield, Nathan R., Jr. 96
Westover, Frances L. 111

/AYLAND D.	108	WILSON, BESS M. E.	108
:DWARD H.	114	WORTHINGTON, ETHEL	108
HOWARD J.	135		

:andidates for Academic Certificate.

RTLE	8	CASE, FANNIE S.	36
.IZABETH	14	CATLIN, MARCUS J.	88
ILEEN		CHAPMAN, EDITH M.	52
MABEL	88	CHAPMAN, HELEN B.	14
'LORENCE	84	CHAPMAN, PAUL P.	12
OBERT	32	CHARPIER, EUGENE	14
RAY M.	22	CIUCCI, FLORENCE	26
ARL	48	CLARK, EARL P.	38
)SSIE P.	61	CLENNY, RUSSELL	50
'H A.	14	CLEVELAND, CARLETON	26
/ALTER	16	COEN, ALBAN W.	16
.D, LUCY	58	COOPERSTEIN, JOSEPH	
BEN F.	42	COVITZ, ADOLPH	45
BERT	39	COYNE, JEANETTE	12
ERTHA	26	CROAK, FRANCES	82
, MAURICE	6	DAHL, HAROLD	47
C. SCOTT	14	DARSIE, MARVIN	36
SSIE E.	32	DASHIELL, JULIET	45
ABEL	16	DECAMP, GRACE F.	38
URT G.	26	DEWITT, HELEN C.	14
ROLD A.	19	DIETER, GEORGE F.	8
TRUDE L.	22	DOOLEY, GERTRUDE	14
ANLEY W.	36	DOYLE, ROBERT	79
THUR	50	DUNCOMBE, SADIE	32
I, PAUL H.	14	DUNDAS, J. ARTHUR	8
'URT C.	6	EBERSOLL, RAYMOND G.	30
, IDA M.	46	EISZNER, ADELINE C.	74
IUGO	56	EISZNER, BESSIE J.	40
KENNICOTT	49	EVERLEY, LESLIE	40
Y, HARRY L.	2	EVERNDEN, W. BLAINE	84
AX	27	FALLS, FREDERICK H.	61
WILLIAM A.	82	FAUST, GEORGE R.	76
OTTO	10	FITHIAN, DAVENPORT	87
IE, ROBERT B.	46	FLANDERS, HARVEY	64
)REW G., JR.	81	FLANDERS, JUNIUS	38
THUR G.	42	FORSTER, HARRY	60
H	36	FOX, EMILY	57
ALBERT		FRAKE EMILY	34
'ILLIAM A.	77	FRANKLIN, GUSTAVE	87

Fraser, Marjorie 40
French, Ira 8
Fritts, Louise 38
Fulton, Eleanor G. 8
Gates, Herbert 16
Giffert, Lillian 24
Gill, Bess 61
Gislander, Florence 8
Gnaedinger, William H. 2
Goehring, Frank 84
Graham, Frank 53
Graham, Jarlath J. 2
Graham, Ralph 40
Gray, Frida H. 20
Griffin, Marybelle 28
Grubbs, H. Homer 14
Haarwig, Effie 34
Hagley, Lyman 12
Haines, C. Grace 50
Hall, Mildred 76
Hallinger, Maurice 16
Harris, Nancy 12
Harris, E. Preble 51
Haskell, John P. 26
Haugan, J. Richard 56
Heile, Robert 4
Hellyer, Harold 16
Henn, Irwin 4
Henn, Walter 72
Hill, Leonard 9
Hinchliff, Alice 32
Hirsch, Harold 26
Hodges, Albert B. 16
Hoffman, Arthur C. 86
Hoffman, Irene M. 32
Hoffman, Paul A. 88
Horn, Grace 16
Howe, Marjorie 40
Huber, William E. 38
Humphrey, Herbert K.
Hunt, Jasper 82
Hunter, Mabel 82
Hunter, Edna M. 42
Huth, Nydia 16
Ince, Bessie 12
Ingersoll, Weber
Jernberg, Prudence
Johnson, Chester B.
Jones, Alma
Jones, Martha
Joseph, Blanche
Judge, Frances C.
Keeler, Ruth M.
Keiler, Arthur
Kelley, Cora
King, George R.
Kobak, Disraeli
Kries, Harry J.
Kreuter, Julia
Kroff, Nellie
Krogman, Lucy
Kubitz, Harvey
Kubitz, Myrtle
Lamb, Vernon W.
Lange, Fred C.
Larson, Lillian
LeMaster, Elsie V.
Lorimer, Leonard
Lorimer, William
Louis, Irwin C.
Lounsbury, Bruce
Lund, Elsie
Lund, Merritt W.
Lyford, Edith L.
Main, Elsie
Main, Julia S.
Mark, Albert
Marteeney, Ollie M.
Martin, Charles P.
Martin, Edwin D.
Mason, Carl B.
Mason, Emma J.
Masters, Ada
May, Lloyd T.
May, Rexford L.
McCauley, Jennie
McClure, Lillian
McGrew, Clarence
McKillip, Monroe H.
McMahon, Agnes

CLAIRE 51
LESTER 8
I. 88
ORGE 28
A 36
B. 4
VART L. 82
SSIE 18
LE 60
MABEL 54
E. EARL 44
LIS H.
ORGE R. 14
NK J. 12
ORGE 42
RA 6
CAROLINE E. 42
ESSY, ISABEL M. 50
RRY 71
LORENCE 61
GH 48
ACE H. 39
ODORE 86
A 30
WILLIAM L. 6
NETTIE 6
ING 61
EN 16
AUD 72
57
Y 12
ALENE 34
LEDA 26
MES R. 16
LIAM O. 50
W. 8
OLPH C. 58
AN 69
LPH 16
MYRA 28
MAS 28
E C. 8
LE
, ELSA 8
LEONA 16
RYAN, MABEL 28
SALOMON, ARTHUR D. 32
SCHMIDT, ROYAL J. 62
SCHOOLER, NATHANIEL 7
SHAFER, ETTA
SHERMAN, OREN G. 16
SHEWMON, DAN 14
SHOEMAKER, J. RALPH 61
SIMINGTON, FRANCES J. 38
SIMONDS, GERTRUDE 18
SKILES, FRANK C. 6
SMITH, EUGENE G. 8
SMITH, HOBERT 50
SMYTH, JOHN U. 86
SNITE, FRED B. 47
SOIBERG, ARTHUR 45
SOMMERS, MARIE K. 12
SOUCEK, EDWARD 6
SPEED, LOUISE M. 14
STARKE, CHARLES H. 38
STAYMAN, EDGAR H. 4
STECKER, HARRY 12
STEIN, IRVING 26
STEPINA, IDA M. 55
STIELOW, ELSIE 14
STRAWBRIDGE, MABEL 86
STREGER, LILLIE 6
STRODE, BRUCE 26
STRUCKMAN, GEORGE R. 4
SULLIVAN, BOETIUS 63
SULLIVAN, MARY 20
SWARTS, NEVA 58
SWISSLER, EDNA 55
SWISSLER, WILLIAM R. 22
SZMERGALSKI, THEODORE 12
TAPP, EDWARD 24
TAYLOR, ROY 20
TAYLOR, VIRGIL 8
THATCHER, EVERETT A. 14
THOMPSON, ELMER 26
THOMSON, JENNIE E. 61
TOWER, RAYMOND C. 52
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True, Charles	21	Westfall, Charles	53
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Ulhorn, Walter	14	Wilder, Harold	80
Underhill, Lee	59	Wilder, Laurence R.	48
Utley, Paul	2	Williams, Noble	47
Walker, Robert G.	42	Wolf, Robert N.	30
Wallace, Clara	79	Woodrow, Isaac A.	16
Wallace, Florence	8	Yampolsky, Jacob	46
Wallace, Robert B.	6	Yampolsky, Rebecca	49
Wells, S. Cecilia	18	Zahn, Anna M.	22
Wernicke, Harry	60	Zoelck, Tillie	10

Unclassified Students.

Ahles, Irene
Amacker, Anna
Ameen, Mirza
Anderson, Gustave
Baldwin, Alice M.
Beedle, Edna M.
Blades, Pearl
Bosworth, Irena
Brown, Anna G.
Brown, Florence C.
Burwash, Elvira T. J.
Butterfield, Buell F.
Copeland, D. Belle
Coulter, Aimee
Davis, Olive E.
Delp, Luella
Dillon, Richard J.
Dobbins, Inez
Drew, Marie J.
Ettelson, Anna D.
Fransted, Irene E.
French, Edward B.
Friedlander, Amy
Friedlander, Minnie
Gruwell, Edna E.
Hafner, Helen
Hallenbeck, Eloise
Harley, Elmer
Harvey, Madge
Izard, Forrest
Johnson, Harold
Kellogg, Helen G.
Knobel, Elizabeth
Kunkel, Lewis
Lohner, Aaste
Maguire, Zaida E.
Manning, Clarence E.
Marshall, Elsie M.
Mason, Caroline
Maulsby, Carrie
McDonald, Florence P.
Miller, J. Wilson
Neil, Jane S.
Parker, Geraldine
Postlewait, Minnie
Race, Effie J.
Reed, Hattie L.
Ryan, Mary A.
Sands, Gertrude
Sater, Adella
Servis, Howard H.
Shewmon, Mattie
Stein, Clara
Stickel, Joseph
Swinney, Ruth
Thorson, Theodore
VanBlarcom, Leah G.
Wheeler, Leon H.
Whidden, Marian
Wiggins, Mildred E.
Williams, Harold H.
Young, Mary A.

ents in School of Engineering.

ımes of students taking evening, summer, or special courses cluded in the following lists.

ts are classified as Candidates for the Degree of M. E., when 90 or more credits, and Candidates for the Academic Cer- hen they have less than 90 credits.

Candidates for the Degree of M. E.

s, Sampson	188
LEXANDER D.	194
DBERT W.	101
ARLES	93
Simon	97
Lee H.	132
AMES A.	116
Walter	142
GENE C.	103
Fred	102
Fred L.	90
Charles F.	166
ANCIS H., Jr.	127
LIAM G.	168
. Norman	133
George L.	96
. Bradford	129
Paul B.	176
Joseph	104
Samuel J.	96
William M.	119
JLIUS	111
RLES	94
Krueger, William E.	90
Lane, Howard	173
Marks, Robert	118
Merrill, Frank	164
Morgan, Harold H.	171
Parsons, Eugene W.	93
Ray, Hugh L.	130
Riffel, Bernhard	127
Robbins, Harold W.	145
Shepard, Holmes A.	93
Singer, David	109
Spoehr, Herman	102
Stenn, Harry	154
Todd, Emery	96
Tolsted, Elmer	128
Van Hagen, Arthur E.	115
Walker, Clifton J.	141
Walsh, Charles	93
Weaver, Harold P.	114
Wheaton, Harry M.	141
Williamson, Alexander	106
Wolcott, Frank E.	91

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DAVID	4
AGER, Walter	50
HARLES	28
ILLIAM	18
ARRY B.	59
AYMOND C.	24
Ashby, Wilbert B.	39
Babb, Horatio	63
Bacci, Albert	6
Bain, Albert	62
Barnard, Glenn M.	20
Baskerfield, Harry	63

Bauerle, Walter E.	18
Benett, James W. E.	2
Benson, Burt L.	52
Binford, Tod	67
Bjurstrom, Herman F.	16
Blahink, Karel B.	40
Bloss, Eugene	14
Bodine, Carl	67
Bonnell, Frank T.	40
Bonnern, Joseph	16
Bradford, Clarkson	60
Brannum, James H.	35
Brett, William G.	2
Bronson, Fred B.	40
Brown, J. Warren	12
Bull, Chauncey	18
Bullard, Kenneth K.	35
Butz, Theodore C.	12
Cadle, William L.	44
Carlson, Carl E.	72
Carlson, Gustaf H.	4
Carpenter, Frank G.	45
Chiville, Gerald D.	26
Christy, Lyman A.	
Clark, Delmer	10
Clark, James R.	20
Cohn, David	42
Coleman, Thomas	4
Collins, Wayne	4
Conway, James	52
Cox, James W.	16
Crawford, William E.	49
Cullis, John R.	30
Curtis, Leonard D.	61
Cutler, Sam C.	26
Dahl, Louis	12
Davenport, F. Earle	30
Davidson, Albert J.	53
Delves, Abraham	8
Dieckman, Albert	56
Dierson, Arthur	2
Dierson, Walter	12
Diven, Carlyle	34
Doherty, John E.	4
Donahue, Mathew	14
Downey, Joseph	
Doyle, Francis	
Doyle, Horace	
Dugan, Charles	
Dyar, H. Huntington	
Ebner, Alfred	
Egan, Buford	
Eggert, George F.	
Evans, Harold	
Ewertsen, Christian	
Ewing, Theodore	
Farnham, Edwin W.	
Fischer, Edmund	
Fisher, Robert E.	
Fitzer, Arthur	
Fitzgerald, Barrett	
Fitzpatrick, Arthur	
Fitzpatrick, Ernest A.	
Fleming, Berkey	
Forbes, James S.	
Ford, Francis L.	
Forsman, Roy	
Fox, Alfred	
France, Harry	
Frank, Lionel H.	
Freiberg, Louis	
Fritts, William W.	
Fürst, William H.	
Galbraith, Alonzo	
Galbraith, John	
Gilbert, Harry N.	
Gordon, D. Grant	
Gordon, Mandel	
Goss, LeRoy	
Grace, John G.	
Grant, Charles B.	
Grant, George C., Jr.	
Graue, Grantley	
Gregg, Harold E.	
Groenlund, Ulrich	
Gyllenhaal, Alvin	
Hale, Ralph	
Halla, Arthur F.	
Halloran, George	
Hammerschmidt, Adolp	

, Edwin, Jr. 66
Harold 14
red C. 66
John 49
rthur H. 6
ames M. 25
awrence 14
y, John T. 4
Fred T. 8
Richard O. 14
s, Peter
ry, Paul 24
Arthur 42
Alfred 10
, Vernon L. 56
, Alfred V. 14
Milton G. 34
, Charles 62
ward 38
, Paul 52
Robert 34
William R. 8
Glenn S. 45
Vincent 82
, Arthur 47
Walter S. 56
son, Benjamin W. 39
Thomas C. 4
ill O. 36
Fred V.
Claude C. 12
Edgar 14
Fred S. 32
anley 2
, Charles M. 82
rthur 18
Conrad 26
mbert A. 29
obert J. 16
homas J. 20
Ernest 6
Michael T. 4
air S. 22
Daniel 8
, Judson 24
Kinzie, Julian M. 12
Kirchman, Maximillian L. 12
Kissinger, Alexander 6
Kistenbroker, Arthur W. 34
Kittredge, Alfred R. 40
Klehm, Hubert I. 20
Knudson, Peter 20
Koepke, Frank O. 16
Kolkow, Charles R. 88
Kopf, Melrose G. 40
Korup, Christian 12
Kreer, George 62
Kreuter, Verner C. 64
Kurtz, Robert 12
LaMontaine, Sidney J. 8
L'Amoreaux, Paul L. 20
Latta, Smith 58
Leitner, Charles B. 6
Levey, Clarence 42
Lewis, Morris S. 4
Libbey, T. Herbert 40
Lindholm, William 40
Lindholm, Oscar C. 6
Lindquist, Frederick H. 14
Lubeck, Arthur 32
Lukey, Loren 12
Lundstrom, Charles 54
MacQueen, Raymond 56
Maguire, William 22
Marsh, Russell 22
Marshall, Franklin D. 35
Martin, Edward P. 50
Maynard, Henry S. 81
McCarthy, Emmett 2
McCreary, Harry 6
McGann, Edward 57
McGregor, Henry G. 8
McLeod, William J. 14
Melcher, Austin 52
Meyer, Herman 52
Michelson, Norman 6
Miller, Robert H. 10
Milholland, Paul 82
Milholland, William 57
Mills, Ernest G.

Minchin, James	12
Moore, D. Ashton	20
Moore, George R.	26
Morgan, Edward J.	57
Moste, Maurice	14
Moulton, Walter R.	60
Muench, George W.	38
Mulock, Lester	26
Munton, James	46
Nelsen, Clarence	14
Noack, Edwin	6
Nolander, Walter A.	12
Northup, H. Richey	8
Nyman, Carl	12
O'Connor, James	24
O'Donnell, Fred	32
Pack, Ferguson	53
Page, Orvillle	28
Page, Walter C.	62
Patitz, George	32
Pearce, George C.	40
Peet, Ova	59
Peyser, Harry	48
Pilat, George I.	30
Pio, Herbert	47
Plum, Ralph	6
Porter, Irving D.	12
Pravdiza, Thomas	35
Prouty, Donald L.	4
Rabe, Edwin O.	34
Rafferty, James A.	50
Rankin, Rolland T.	38
Reed, C. Edward	62
Reich, Max C.	41
Reynolds, George W.	4
Rhodes, Bradford	10
Riemer, Fred	4
Ritchie, Prescott C.	70
Roehl, Ernest E.	22
Rom, Palmer W.	53
Romoser, William H.	4
Ruehl, William L.	
Savage, Howard	51
Schanze, Harry	
Schiefer, Ben F.	8
Schiess, Roy E.	6
Schram, John W.	1
Schramm, William F.	
Schulz, Robert, Jr.	
Schulze, Edward R.	3
Schweiger, Edward R.	2
Scott, Robert D.	8
Sears, Alexander	
Sherman, Victor	1
Simonds Herbert R.	6
Skillin, T. Chester	6
Skooglund, David	
Smith, Delbert C.	
Smith, Edward A.	
Smith, Elmer	
Smith, A. Warren	
Sommerfeld, Otto	
Sorensen, Carl P.	
Sperry, David R.	
Stearns, Irving	
Stewart, Raye	
Stoetzel, William	
Stone, Porter	
Sullivan, William T.	
Sutton, Harry	
Sweet, Edward	
Taylor, Percy	
Tischer, Arthur H. V.	
Todd, Eric D.	
Tracy, Daniel	
Utter, Richard I.	
Visher, Stephen S.	
Wahl, Orlin	
Wakefield, Lloyd	
Waldschmidt, Theodore	
Walker, Charles P.	
Walter, Charles A.	
Walton, George H.	
Warr, Harold	
Wayman, James W.	
Weichmann, Arthur	
Weinert, Max	
Wells, George	
Wenborg, Oscar A.	
White, William	

, RICHARD H. R. 38
OHN T. 40
E, AUBREY 28
E, LAWRENCE 53
M, E. PAUL 48
RAYMOND C. 74
FRED 14
)RGE G. 65
ARTHUR A. 82
MEREDITH 59
RAYMOND G. 16
IN G. 37
)BERT W. 6
WILSON, ALBERT H. 2
WINLACK, GEORGE 50
WINTER, ALBERT H. 48
WHITMAN, WILLIAM F. 14
WOLCOTT, KENNETH O. 61
WOLF, WILLIAM J. 38
WORLEY, ROY J. 16
WRAY, PARK O. 18
WRIGHT, GEORGE F. 4
ZAHN, CHARLES J. 34
ZIELASKOWSKI, JOHN 12
ZISKA, ADAM 49

Unclassified Students.

:STER M.
:OYAL F.
LIAM J.
LLIAM H.
G. FREDERICK
RLIN
. M.
IAM
NCE W.
IAM H.
. ALLEN
R. PAUL
T L. G.
RGE
ILLIAM R.
'S, JAMES A.
:LINTON H.
ARRY R.
DWARD W.
RNELIUS
JOHN A.
STEWART
, GEORGE S.
WILLIAM P.
:, ROY R.
'OM H.
:DWARD
Y
MAGUIRE, EDWARD S.
MCCHESNEY, SHERMAN
MOESTUE, THORALF
MULLOY, JOHN
MUSSER, MARTIN E.
NASH, GEORGE R.
NELSON, BYRON A.
NORRIS, FREDERIC L.
OSIUS, FREDERICK
PETTERSEN, GEORGE
PRIDHAM, EDWIN
REICH, HARRY
ROBBEL, WILLIAM G.
SCHAAL, ALVIN H.
SCHARF, ADOLPH
SHERER, WILLIAM
SHERWOOD, BENJAMIN W.
SNOW, FRANK C.
SOMMERFELD, WALDO
STARKEY, WARREN
STEBBINGS, HARRY E.
TIERNEY, EDWARD
TOBEY, LEE H.
WELLS, HARRY
WOELFFER, GEORGE
WOELKE, HENRY
YOUNG, F. JOSEPH

Summary of Attendance.

The School of Arts.

Graduates and Associates in Arts	11
Candidates for the Title of Associate	121
Candidates for the Academic Certificate	280
Unclassified Students	62
Special and Summer Students	167
Students in Day Classes	641
Students in Evening Classes	701

The School of Engineering.

Candidates for the Degree of M. E.	45
Candidates for the Academic Certificate	307
Unclassified Students	55
Special and Summer Students	95
Students in Day Classes	502
Students in Evening Classes	661

Total Attendance.

Day Students in the Institute	1,143
Evening Students in the Institute	1,362
Total	2,505

LEWIS INSTITUTE

EIGHTH ANNUAL REGISTER

CHICAGO

1904

EIGHTH ANNUAL REGISTER

OF THE

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CORPORATION.

OFFICERS.

*JOHN A. ROCHE, 1894-1904.
President.
CHRISTIAN C. KOHLSAAT, 1904.
President.

THOMAS KANE,
Vice-President.
JOHN McLAREN,
Secretary and Treasurer.

TRUSTEES.

BERNARD A. ECKHART,
OLIVER H. HORTON,
THOMAS KANE,
CHRISTIAN C. KOHLSAAT,
JOHN McLAREN.

BOARD OF MANAGERS.

GEORGE N. CARMAN,
BERNARD A. ECKHART,
WILLIAM R. HARPER,
JAMES B. HERRICK,
OLIVER H. HORTON,
EDMUND J. JAMES,
THOMAS KANE,
CHRISTIAN C. KOHLSAAT,
ALBERT G. LANE,
JOHN McLAREN,
JOHN F. WALLACE.

BUSINESS AGENT, WILLIAM H. HALL.

* Died February 10, 1904.

Calendar 1904-1905.

July 11, Monday—Summer Session begins.

Aug. 19, Friday—Summer Session ends.

Sept. 12-16, Monday to Friday—Final Examinations for Admission.

Sept. 19, Monday—Autumn Quarter begins for students who have not heretofore been in attendance at the Institute. Recitations for one week as a basis for permanent classification.

Sept. 26, Monday—Autumn Quarter begins for students who were in regular attendance during the year 1903-1904.

Oct. 3-7, Monday to Friday, Evenings—Registration and Classification of candidates for admission to Evening Classes.

Oct. 10, Monday—Evening Classes begin.

Nov. 24-25, Thursday and Friday—Thanksgiving Recess.

Dec. 16, Friday—Autumn Quarter ends.

Holiday Recess for two weeks.

Jan. 2, Monday—Winter Quarter begins.

Feb. 22, Wednesday—Washington's Birthday—a Holiday.

March 24, Friday—Winter Quarter ends.

Quarterly Recess for one week.

April 3, Monday—Spring Quarter begins.

May 30, Tuesday, Memorial Day—a Holiday.

June 10, 17, 24, Saturdays, from 9 A. M. to 1 P. M.—Preliminary Examinations for Admission.

June 23, Friday—Spring Quarter ends.

FACULTY.

GEORGE NOBLE CARMAN, Director.

A. B., University of Michigan, 1881; Principal Ypsilanti (Mich.) High School, 1880-82; Superintendent of Schools, Union City, Mich., 1882-85; Principal Brooklyn (N. Y.) Grammar School No. 15, 1885-89; Principal St. Paul (Minn.) High School, 1889-93; Dean of the Academy of the University of Chicago, Morgan Park, Ill., 1893-95.

WILLIAM ALBERT GREESON, Professor of Mathematics, and Dean of the Faculty.

A. B. and A. M., University of Michigan, 1879; Principal Flint (Mich.) High School, 1879-81; Instructor in Grand Rapids (Mich.) High School, 1881-85; Principal of Grand Rapids (Mich.) High School, 1885-96.

EDWIN HERBERT LEWIS, Professor of English.

A. B., Alfred University, 1887; A. M., *ibid.*, 1887; Senior Teacher, Vice-Principal, Plainfield (N. J.) High School, 1887-88 and 1889-90; Student in Italian libraries, 1888-89; Professor of Latin, Alfred University, 1890-92; A. M. and Ph. D., Syracuse University, 1892; Fellow in English, University of Chicago, 1892-93: Assistant in Rhetoric, *ibid.*, 1892-94; Ph. D., University of Chicago, 1894: Instructor in Rhetoric, *ibid.*, 1894-96; Associate Professor, *ibid.*, 1896-99; Associate Professor, Lewis Institute, 1896-99.

PAUL MELLEN CHAMBERLAIN, Professor of Mechanical Engineering.

B. S., Michigan Agricultural College, 1888; M. E., Cornell University, 1890; with Brown Hoisting and Conveying Machine Co. Cleveland, Ohio, 1889-90; Assistant Engineer with Frick Co., Waynesboro, Pa., 1890-92; Mechanical Engineer for Hercules Iron Works, 1892-93; Assistant Professor Mechanical Engineering, Michigan Agricultural College, 1893-96; Assistant Professor of Mechanical Engineering, Lewis Institute, 1896-99; Member of American Society of Mechanical Engineers; Member of Western Society of Engineers.

CHARLES WESLEY MANN, Professor of History.

A. B., De Pauw University, 1887; A M., *ibid.*, 1888; Instructor in Mathematics and French, De Vaux College, N. Y., 1887-88; Instructor in Mathematics, and Superintendent, Kenyon Military Academy, Gambier, Ohio, 1888-91; Associate Principal, Illinois Military Academy, Morgan Park, 1891-92; Dean of Chicago Academy, 1893-96; Assistant Professor of History, Lewis Institute, 1896-1900.

PHILIP BELL WOODWORTH, Professor of Physics and Electrical Engineering.

B. S., Michigan Agricultural College, 1886; M. E. in Electrical Engineering, Cornell University, 1890; with Brush Electric Co., Cleveland, Ohio, 1889-90: Student in University of Berlin, 1891-92; Assistant Professor in charge of Physics and Electrical Engineering, Michigan Agricultural College, 1892-99; Assistant Professor of Physics and Electrical Engineering, Lewis Institute, 1899-1901; Member of American Institute of Electrical Engineers; Member of Western Society of Engineers.

CLARENCE ELBERT DEPUY, Professor of Mechanical Engineering and Shop Work.

B. S. in Mechanical Engineering, University of Michigan, 1891; in Machine Shop of Dennis Machine Co., Jackson, Mich., 1883-87; Instructor in Machine Shop, Chicago Manual Training School, 1891-96; Member of American Society of Mechanical Engineers.

ALEXANDER WILLETT MOSELEY, Professor of Applied Mechanics.
S. B., Massachusetts Institute of Technology, 1891; Draftsman, World's Columbian Exposition, Chicago, 1891-93; with Webster Mfg. Co., Chicago 1894-95; Chief Draftsman Atlanta Exposition, summer 1895; Instructor in Mechanical Engineering, Massachusetts Institute of Technology, 1895-99; with Wm. Sellers & Co., Philadelphia, 1899; Assistant Professor of Mechanical Engineering, Michigan Agricultural College, 1900; Member of American Society of Mechanical Engineers; Member of the Western Society of Engineers; Member of the American Society for Testing Materials.

WARREN RUFUS SMITH, Assistant Professor of Chemistry.
A. B., Bowdoin College, 1890; Ph. D., University of Chicago, 1894; Instructor in Science, Leicester Academy, Leicester, Mass., 1890-91; Scholar in Chemistry, Clark University, 1891-92; Fellow in Chemistry, University of Chicago, 1892-94; Assistant in Chemistry, Bowdoin College, 1894-95; Instructor in Science, New Bedford High School, New Bedford, Mass., 1895-96; Instructor in Chemistry, Lewis Institute, 1896-1900.

HERBERT EDGAR COBB, Assistant Professor of Mathematics.
A. B., Wesleyan University, 1887; A. M., *ibid.*, 1890; Instructor in Mathematics, Maine Wesleyan Seminary and Female College, 1887-90; Instructor in Mathematics, University of Colorado, 1890-92; Graduate Student in Mathematics and Lecturer in University Extension Division, University of Chicago, 1892-96; Instructor in Mathematics, Lewis Institute, 1896-99.

* MILO GRANT DERHAM, Assistant Professor of Greek and Latin.
A. B., Cornell University, 1892; Instructor in Greek and Latin, Dayton Academy, Dayton, Ohio, 1892-93; Instructor in Latin, Academy of Northwestern University, 1893-94; Instructor in Greek and Latin, Chicago Academy, 1894-96; Instructor in Greek, Lewis Institute. 1896-99.

JAMES WALTER FERTIG, Assistant Professor of History.
A. B., University of Nashville, 1890; A. M., *ibid.*, 1891; Graduate Student in History, Vanderbilt University, 1891-92; Instructor in History and Mathematics, Montgomery Bell Academy, Nashville, 1891-93; Graduate Student in History and Political Science, University of Chicago, 1893-97; Fellow in History, *ibid.*, 1894-97; Lecturer in the Extension Department, *ibid.*, 1895-96; Ph. D., *ibid.*, 1897; Professor of History, University of Arkansas, 1898-99; Instructor in History, Lewis Institute, 1899-1902.

JOSEPH RALEIGH NELSON, Assistant Professor of Latin.
A. B., University of Michigan, 1894; Instructor in Latin in John Marshall High School, Chicago, 1894-1900; Instructor in Latin, Lewis Institute, 1900-02; Graduate Student in Latin, University of Michigan, 1902-03; A. M., University of Michigan, 1903.

FRED A. ROGERS, Assistant Professor of Physics and Electrical Engineering.
B. S., in Electrical Engineering, University of Michigan, 1894; Electrical Engineer for Vermillion Milling and Electric Co., Vermillion, S. D., 1895-96; Assistant in Physics, Lewis Institute, 1896-97; Instructor in Physics and Electrical Engineering, *ibid.*, 1897-1902; Member of Western Society of Engineers.

JESSIE LOUISE JONES, Assistant Professor of German.
A. B., Doane College, 1884; Graduate Student University of Michigan, 1894-95; Student in Berlin and Paris, 1888-90; Teacher in Jacksonville Female Academy, 1890-93; Teacher of German, Chicago Preparatory School, 1893-94; Teacher of German, Chicago Female College, 1894-95; Fellow, University of Chicago, 1895-96; Ph. D., *ibid.*, 1897.

* Absent on leave

GEORGE LEE TENNEY, Assistant Professor of Latin.

A. B., Denver University, 1894; Principal High School, Manitou, Colo., 1894-96; Instructor in Latin, Denver Manual Training High School, 1896-99; Graduate Student in Latin, University of Chicago, 1899-1900; A. M., University of Denver, 1900; Instructor in Latin, Denver Manual Training High School, 1900-1902; Instructor in Latin, Lewis Institute, 1902-03.

DUANE STUDLEY, Assistant Professor of Mathematics.

B. S., Cornell University, 1881; Principal School, Corfu, N. Y., 1881-82; Instructor in High School, Cleveland, Ohio, 1882-86; Graduate Student, Cornell University, 1886-87; Instructor in Mathematics and Astronomy, *ibid.*, 1887-92; Professor of Mathematics, Wabash College, 1892-1901; Professor of Mathematics, Kalamazoo College, 1901-03.

LEA RACHEL DELAGNEAU, Instructor in French.

Instructor in French, Chautauqua, N. Y., 1887-92; Instructor in French, Morgan Park Academy, 1893-95; Instructor in French and History in High School, Ottawa, Ill., 1888-96.

LOUIS EDWARD POPE, Instructor in Mathematics.

Accountant for Bayfield Brownstone Co. and R. D. Pike, Wholesale Lumber, Bayfield, Wis.. 1886-91; Instructor in Arithmetic and Bookkeeping in High School, St. Paul, Minn., 1891-96.

CHARLES EMERSON PEET, Instructor in Physiography.

B. S., University of Wisconsin, 1892; Fellow in Geology, University of Chicago, 1892-95; Assistant New Jersey Geological Survey, 1891-95; Assistant U. S. Geological Survey, 1895-97; Instructor in Geology and Physical Geography, Englewood High School, 1897-99.

HELEN DOUGAL STREET, Instructor in Greek and Latin.

A. B., University of Wisconsin, 1876; A. M., *ibid.*, 1879; Instructor in High School, Madison, Wis., 1877-81; Instructor in Latin, University of Wisconsin, 1883-84.

PHILEMON BULKLEY KOHLSAAT, Instructor in English.

Ph. B., University of Chicago, 1894; Teacher in Chicago Heights High School, 1894-95; Instructor in Latin. Chicago Academy, 1895-96; Fellow in English, University of Chicago, 1897-99.

GEORGE ALEXANDER ROSS, Instructor in Woodwork.

Instructor in Woodwork, Chicago Manual Training School, 1890-93; Instructor in Woodwork, Jewish Training School, Chicago, 1893-98.

CHARLES EDGAR HOYT, Instructor in Foundry Work.

Instructor in Foundry Work and Pattern Making, Michigan Agricultural College, 1894-98; with Walker Manufacturing Company, Cleveland, Ohio, summer of 1897.

EDWARD BURTON DEGROOT, Instructor in Physical Culture.

Physical Director, Montclair Military Academy, 1891-97; Special Instructor, Harvard University Summer School of Physical Training, 1897; Student, Medical College of Virginia, 1897-98.

* MARIE ELSA BLANKE, Instructor in Freehand Drawing.

Graduate of the Art Institute, Chicago.

JOHN LORD BACON, Instructor in Forge Work.

Graduate of Chicago Manual Training School, 1896; with Illinois Steel Co., 1896; with Marine Iron Works, 1896-98; Junior Member of American Society of Mechanical Engineers.

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* Absent on leave.

JULIA DUMKE PEET, Instructor in German.
Ph. B., University of Chicago, 1898; Student at University of Berlin, 1897-98; Assistant Principal in High School, Belle Plaine, Iowa, 1891-93.

ARCHIBALD WHITTIER SMALLEY, Instructor in Latin.
A. B., University of Michigan, 1898; Instructor in Adrian (Mich.) High School, 1898-99.

DIC HECTOR TROWBRIGE, Instructor in Chemistry.
B. S., University of Michigan, 1898; Instructor in Adrian (Mich.) High School, 1898-99; Assistant in Chemistry, University of Michigan, summers, 1899-1900.

CHARLES SCHENCK, Jr., Instructor in Mechanical Drawing.
Student at University of Illinois, 1896-98: Draftsman with Troy Laundry Machinery Co., 1898-99; with W. S. McKinney, Mechanical Engineer, 1899; with Chicago Union Traction Co., Engineering Department, 1899-1901; with Purdy & Henderson, Civil Engineers, 1901; Junior Member of American Society of Mechanical Engineers.

LEWIS GUSTAFSON, Instructor in English.
A. B., University of Chicago, 1900; Assistant in English, Lewis Institute, 1897-1900.

EDWARD HERMAN LAY, Instructor in Mathematics.
A. B., Yale University 1894; Instructor in Mathematics, West Jersey Academy, 1895-96; New York Military Academy, 1896-97; Buckley High School, 1897-98; Graduate Student, University of Chicago, 1898-99; Principal Buchanan College, Troy, Mo., 1899-1900.

KATE HEINTZ WATSON, Instructor in Domestic Economy.
Teacher in Public Schools, Princeton, Ill.; Graduate of Armour Institute of Technology in Department of Domestic Arts.

ANNA FORSTER, Instructor in French.
Graduate of Royal Seminary, Breslau, Germany, 1872; Instructor in German and French, Hillside School, Wisconsin, 1896-98.

WILLIAM PARKER HAWLEY, Instructor in Mechanical Drawing.
B. S., Michigan Agricultural College, 1892; Student, Cornell University, summer, 1899; Machinist with Troy Laundry Machinery Co., 1895-96; Draftsman with Coe Typesetting Machine Co., 1896-98; Teacher of Manual Training, Chicago Public Schools, 1898-1901; Draftsman, Ordnance Office, Washington, D. C., 1901; Junior Member of American Society of Mechanical Engineers.

JOHN DERK NIES, Instructor in Physics and Electrical Engineering.
B. S., Michigan Agricultural College, 1894; with Municipal Lighting Plant, Holland, Mich., 1894-1901; Student, Cornell University, 1900; Member of American Institute of Electrical Engineers.

ROBERT HENRY TAFT, Instructor in Machine Shop.
Graduate of English High and Manual Training School, Chicago, 1894; with Miehle Printing Press Mfg. Co., 1894-1901.

MARY MOULTON SMITH, Instructor in Domestic Economy.
Graduate of Gannett Institute, Boston, 1888; Associate in Science, Lewis Institute, 1902.

SARA ANNA JANSON, Instructor in Hygiene.
Graduate of Mankato (Minn.) State Normal School, 1892; Assistant Principal of High Schools, Little Falls and Brainard, Minn., 1892-97; B. S., University of Chicago, 1900; Instructor in Minn. State Teachers' Training School, summer, 1901-02; M. D., Rush Medical College, 1903.

JESSE MYRON OWEN, Instructor in English.
Ph. B., Iowa College, 1900; Instructor in English, French, and German in Ashland (Ky.) High School, 1900-01; Instructor in English and History in Drury College Academy, 1901-02.

KATE BELLE MILLER, Instructor in English.
Ph. B., University of Chicago, 1902.

HERBERT MERRILL WHEELER, Instructor in Mathematics.
B. E. E., University of Minnesota, 1896; with Fort Wayne Electrical Works, 1896-98; with Engineering Department of Chicago Union Traction Company, 1898-1903.

FRANCES CHRISTINE BASSETT, Instructor in Freehand Drawing.
Graduate of Art Institute, Chicago.

ETHEL PERCY ANDRUS, Instructor in English.
Associate in Literature, Lewis Institute, 1902; Ph. B., University of Chicago, 1903.

JOSEPH EDWARD HORA, Instructor in Chemistry.
Associate in Science, Lewis Institute, 1902; B. S., University of Chicago, 1903.

GEORGE PLIMPTON ADAMS, Instructor in Philosophy* and Biology.
A. B., Harvard University, 1903; Student in Chicago Theological Seminary and in the University of Chicago, 1903-04.

KATHARINE I. INGERSOLL, Instructor in Domestic Economy.
Student at Oberlin College, 1887-89; Teacher in Denver Public Schools, 1893-1903.

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*Instruction in Philosophy and Ethics was given in 1903-04 by JAMES HAYDEN TUFTS, Ph.D., Professor of Philosophy in the University of Chicago.

Other Officers and Assistants.

ALEXANDER D. BAILEY, M. E., Mechanical Drawing.
AGNES BROWN, Cookery.
FRANK W. CADY, A. B., English and Mathematics.
ZOURA CLARK, English.
HARLEY R. COLVER, Ph. B., English.
WALTER FORSTER, Mechanical Drawing.
GUSTAVE FRANKLIN, Clerk.
CHESTER N. GOULD, A. M., German.
NOBLE S. HEANEY, A. B., Latin.
CHARLES F. HENNING, Mechanical Drawing.
PAUL HENNING, Mechanical Drawing.
FRANK E. HERMANNS, S. B., Structural Steel Work.
HJALMAR HERTZ, M. E., Mechanical Drawing.
HERBERT W. HESS, English.
MARION HEYWOOD, Physical Culture.
CHARLES P. HULBIRD, Mechanician and Curator.
JAY S. JACKSON, A. B., English.
WILLIAM J. KEARNEY, B. S., Engineer.
WILLIAM M. KINNEY, Wood Work.
MAY L. LESTER, Cookery.
AASTE LOHNER, Cookery.
GEORGE A. MAIN, B. S., Machine Work.
LYDIA MOJONNIER, Accountant and Stenographer.
EDWIN G. NOURSE, English.
EUGENE PARSONS, Clerk.
EVA POPE, Accountant and Stenographer.
LENORE F. PRESTON, B. S., Physical Culture.
HAROLD ROBBINS, Machine Sketching.
IDA SERVEN, Elocution.
MATTIE E. SHEWMON, Domestic Economy.
ERNEST SICARD, French.
RAYNA SIMONS, Latin and Greek.
JOHN C. SOUTH, M. S., Mathematics.
DON FERNANDO STAUD Y XIMENES, M. E., Spanish.
JOSEPH STICKEL, English.
FRANCES TALCOTT, Librarian.
JOHN B. THOMAS, M. A., Mathematics.
LESLIE A. TOUZALIN, Chemistry.
JOHN A. TUCK, Ph. B., Mathematics.
RICHARD UTTER, Physics.
OTTO WICHERSKI, English.
E. C. WINTERS, Accounting and Penmanship.

Organization and Equipment.

Historical Sketch.

The Lewis Institute owes its existence to the late Allen C. Lewis, who, by his will, which was admitted to record November 1, 1877, left a large part of his estate for the support of the Institute, and provided for its organization. Articles of incorporation for the Institute thus projected were granted by the Secretary of the State of Illinois, July 9, 1895.

James M. Adsit, Henry F. Lewis, and Hugh A. White were named in the will as the first trustees of the estate, the estimated value of which in 1877 was five hundred and fifty thousand dollars. Credit is due to these trustees, and especially to Hugh A. White, for such efficient management that the estate amounted, when turned over to the trustees of the Lewis Institute, November 21, 1895, to one million six hundred thousand dollars.

John A. Roche, Christian C. Kohlsaat, and John McLaren, under whom the Institute was incorporated, constituted the board of trustees from May 28, 1894, until the completion of the first buildings. The sites previously chosen having proved unsuitable, the trustees selected and purchased, at an expense of one hundred and sixty-nine thousand dollars, the principal portion of the block extending from Monroe street to Madison, between Winchester avenue and Robey street. This site is centrally located in the West Division of Chicago, and is easily accessible from all parts of the city by means of several lines of surface cars, and the Lake street and Metropolitan elevated roads.

The erection of the first buildings was commenced in May, 1895. The Institute was opened in September, 1896.

Organization.

The Institute consists of a SCHOOL OF ARTS and a SCHOOL OF ENGINEERING.

The School of Arts comprises the instruction which is given in English, history, mathematics, physiography, physics, chemistry, biology, philosophy, Latin, Greek, German, French, Spanish, domestic economy, and freehand drawing. The courses offered in these subjects are outlined on pages 30-52.

The School of Engineering offers instruction in mechanical and electrical engineering to students who wish to become professional engineers. The courses of instruction in wood, pattern, foundry, forge, and machine shops, together with those in drawing, design, sketching, applied mathematics, electrical and mechanical engineering laboratories, are outlined under Engineering, pages 56 to 61. The aim is to present these subjects so that the student will become familiar with the underlying principles and acquire intelligence and skill in manipulation. Persons who intend to follow a trade allied to engineering may pursue such special courses as are recommended after consultation with the Director. The instruction given at night furnishes similar opportunities to those who are occupied during the day.

The Buildings and Their Appointments.

The buildings are fire-proof structures of brick, sandstone, terra-cotta, and steel, and have been erected at a cost of four hundred thousand dollars for buildings, and one hundred and fifty thousand dollars for equipment.

The Arts Building, at the corner of Madison and Robey streets, is a six-story structure; the Engineering Building, on Robey street, has seven stories; and the Gymnasium, in the rear of the other buildings, has two stories. A high, well-lighted basement occupies the entire space covered by all the buildings and the alleys which separate them.

Both the Engineering and the Arts Buildings are supplied with elevators and the most approved appliances for heating

and ventilation, and are equipped with all apparatus needed for the successful accomplishment of the work that has been undertaken.

The Library.

The library consists of twelve thousand volumes, selected with immediate reference to the needs of each department. It is essentially a working library, containing all necessary reference works, together with representative books in the various sections of history, biography, literature, fine arts, engineering, mathematics, philology, and sociology. There are special libraries connected with the class-rooms in physics and chemistry. One hundred and sixty-three periodicals are currently received.

Throughout the school year the library is open from eight a. m. to five thirty p. m.; during the session of the night school the hour for closing is nine thirty p. m. The students at all times have free access to the shelves. Library assistants serve in turn at the reference desk and assist in making the students familiar with the arrangement of the books and the use of the dictionary catalog. It has been attempted to make the catalog a clear, simple guide to the resources of the library and to keep it free from confusing technicalities. The Dewey system of classification is used, with Cutter book numbers.

The Laboratories.

The *Geographical and Geological Laboratory* equipment includes the following: Topographical atlas sheets of the United States to the number of several hundred; United States Coast and Geodetic Survey charts and Geological folios; Mississippi and Missouri river charts; pilot charts of the Atlantic and Pacific oceans; weather maps and charts; relief globe of the earth; relief maps of the United States and of selected localities; collections of common rocks and minerals; several hundred lantern slides; tables and facilities for moulding topographic features; books of reference.

The rooms assigned to the *Department of Chemistry* occupy the west end of the fifth floor. They include lecture-room, departmental library, general laboratory, analytical laboratory, organic laboratory, balance room, and store room. The lecture room has a seating capacity of three hundred. The laboratories are furnished with convenient desks, supplied with water and gas. In each laboratory there is a liberal number of hoods, each of which is exhausted by an electric fan. The store room is supplied with all the apparatus needed for the courses as outlined. It also contains a full list of chemicals, both organic and inorganic, including a set of specimens of the most important naturally occurring compounds of each element. The balance room is provided with Sartorius analytical balances. The department library includes the best English, German, and French reference works, and the current English and American periodicals.

The east end of the fifth floor is used for the work in *Domestic Economy*. It contains a lunch room and a kitchen, a cooking laboratory, and recitation rooms.

The *Lunch Room* is large, airy, and in every way attractive. Lunch is prepared in the Institute kitchen, under the direction of the instructor in domestic economy. The bill of fare always includes soup, milk, chocolate, sandwiches, fruit, and a warm dish, such as meat-pie or baked beans, and usually a salad and a light dessert. Students who bring their lunches from home are permitted to use the lunch room tables. They may, if they desire, supplement their lunches with articles from the bill of fare.

Next to the lunch room is the *Cooking Laboratory*. This has accommodations for sixteen students, with every facility for individual work.

The Department of Physics has an especially equipped lecture room with stereopticon, hydraulic lift, pressure gauges, vacuum gauges, electrical instruments, and recording hygrometer. The lecture table is provided with water, compressed air, steam, and Chapman pump for producing vacuum. The rooms for the use of the department are: general physics laboratory, departmental library, apparatus and preparation

room, photometric rooms, private workroom, advanced laboratory, electrical measurements room, and photographic rooms. In the advanced physics laboratory each table is provided with four slate-lined fuse boxes, from which different currents for use in testing may be obtained. The reference library is supplied with a large assortment of books on the subjects of Physics and Electricity, and the leading periodicals of this country and Europe. The photometric room is equipped with a Lummer-Brodhun photometer and standard lamps.

The workroom is in charge of a competent mechanician, and is equipped with an eight-inch Rivett precision lathe, with attachments for milling, grinding, and screw-cutting, a Walker grinder, and numerous hand tools.

The laboratories are fully equipped with all apparatus for quantitative work in general physics and electricity. Some of the more recent additions to the outfit for work in light are the following: A Schmidt and Haensch spectrometer, a Schmidt and Haensch polariscope, a Michelson interferometer, and a Newton lecture-room polariscope.

The electrical equipment consists of standards of resistance, capacity, self-induction, and electromotive force; resistance boxes, bridges, galvanometers, and electrometers from Nalder Brothers & Co., Elliott Brothers, and Hartmann & Braun; also dynamometers and Westen & Whitney voltmeters, and ammeters of various types and ranges. A twelve-inch induction coil furnishes an important part of the equipment. Specially designed switch-boards are located in the general physics laboratory and in the advanced laboratory. The latter is equipped with a Weston voltmeter, a Weston ammeter, and an automatic circuit breaker.

The apparatus in the engineering laboratories is also available for use in the department of physics.

The Shops and Engineering Laboratories.

The *Foundry,* on the sixth floor of the engineering building, is well lighted from skylights in the roof and windows in the side and end.

The moulding floor is made of cedar block placed on end, and the floor around cupola and furnaces is of brick. There are places for sixteen students, each place having a moulding floor and a bench, and each bench an equipment of shovel, riddles, rammers, bellows, trowels, slicks, lifters, strikes, gate cutters, etc.

The remaining equipment consists of a core room, having a core bench with bins for the different materials used; a core oven 4 feet wide by 6 feet long by 6 feet high, which can be fired either by gas or coke, and rack for core boxes and stock cores; two cupolas, one 16 inches inside the lining, hung from ceiling on trunnions, the other 24 inches inside the lining, supported on 4 posts; two brass furnaces; a 24 inch by 38 inch rattler; a double emery grinder, and an 18 inch cupola fan. The machinery is driven by a 5 horse-power electric motor. A 16 foot hand-power traveling crane runs from the cupola nearly across the building and commands the floor used for large work. A track suspended below the crane track runs from the cupola to all the moulding floors, and is used to carry a large ladle of iron from which small ladles are filled when pouring. A class room and an office open off the foundry. In the center of the building above the sixth floor is a room used for pattern storage.

The *Pattern Shop* on the fifth floor is equipped with eight double benches, each side having a vise, a general closet, and four locked drawers. The closets in the benches contain the general tools used by the students in common, and the drawers contain sets of edged tools for the use of the individual student. Special tools and supplies are kept in the tool room. The machines in the pattern shop are one 24 inch 12 feet, and three 16 inch 6 feet, overhanging spindle lathes; two 12 inch 5 feet, and two 11 inch 4½ feet lathes; one 26 inch surface planer; one universal circular cut off and ripsaw; one 36 inch band saw; one grindstone; one emery tool grinder, and one universal trimmer. A case of individual lockers is provided in which students keep small work while it is in process of construction, and a special room is provided for keeping larger work. The

saws and planes are belted to individual motors, and the lathes are driven from two short line shafts, each of which is driven by a motor. A class room and an office open off the shop.

The *Elementary Wood Shop* is equipped with nine double benches similar to those in the pattern shop, and has also four 10 inch by 3½ feet, and fourteen 11 inch by 3½ feet, lathes driven by a 10 horse-power electric motor.

The *Machine Shop* is on the fourth floor and occupies two separate rooms. The shop at the north end of the building is for elementary machine work, and the south shop is for advanced students. Between the two shops, and communicating with both is the tool and stock room, where all small tools and supplies are kept.

The equipment of the elementary shop consists of one 12 inch 5 foot engine lathe, with draw chucks and taper attachment; three 4 inch 6 foot, and one 15 inch 6 foot engine lathe with taper attachment and compound rest; seven 14 inch 6 foot, and one 15 inch 6 foot plain engine lathe; two 12 inch 4 foot speed lathes; one 16 inch crank shaper; one 18 inch rack shaper; one No. 1 plain miller; one double-wet emery tool grinder; one 18 inch drill press, and sixteen vises placed on a bench running along two sides of the shop. A bank of raised seats from which a good view of the different machines can be obtained is placed in one corner of the room to be occupied by students when general instruction is given. Near the entrance is placed a case of small lockers in which the students keep their work and individual tools. The machines in this room are driven by a 10 horse-power electric motor, attached to the ceiling.

The *Machine Shop* for advanced work is equipped with one 24 inch 16 foot engine lathe, with compound rest and taper attachment; one 18 inch 12 foot engine lathe with compound rest; one 16 inch 8 foot, and one 15 inch 6 foot engine lathe, with taper attachments; one 14 inch 6 foot tool maker's lathe with compound rest, draw chucks, and taper and backing off attachment; one 14 inch 6 foot plain engine lathe; two 12 inch 4 foot speed lathes; one No. 3 screw machine, with vise feed;

one No. 2 universal miller; one No. 3 universal miller; one No. 2 universal grinder; one 26 inch rack shaper; one 24 inch by 24 inch by 6 foot planer; one 24 inch back geared drill press; one 13 inch sensitive drill press; one wet emery tool grinder; one universal cutting grinder; one circular cut-off saw; six vises placed on wood benches along the walls on two sides of the shop; and four vises on iron benches placed on the erecting floor and among the machines. All the tools in this shop are driven by independent direct current motors, with a speed changing device placed on each machine. On one side of the shop is a case of small lockers in which students keep their work and individual tools. In the tool room are kept the general tools and cutter holders belonging to the machines, all the small tools, scales, standard gaugers, measuring instruments, supplies, and general stock used in the work of the shops. The tool room is in charge of an attendant who, by means of the check system, issues tools to students as they are needed in the work. A 16 foot hand-power traveling crane, mounted in the center of the shop so that it can traverse the whole width of the building, provides for the handling of heavy work and parts of machines and tools. A class room and an office open off the shop.

The *Forge Shop* is in the basement of the engineering building, but is well supplied with light during the day by windows on three sides, and at night by arc lights. The equipment consists of sixteen ordinary forges; four large forges for ordinary work; one gas tempering forge; one heating forge; one annealing and case hardening furnace; three 250 pound, one 200 pound, and fourteen 150 pound anvils; one 200 pound steam hammer; the hand hammers, sledges, fullers, swages, punches, chisels, tongs, and similar tools necessary for ordinary forge work; one bar shear for cutting stock; one hardening tank with pipe for circulating water; and one water cooled oil hardening tank. A 12 foot hand-power traveling crane handles large work for the steam hammer, large forges, heating and annealing furnaces, and the hardening tanks. The smoke from the forges is taken away

through down draft hoods by a 60 inch steel exhaust fan, and the blast is supplied by a 24 inch blower, both being driven by a 15 horse-power motor. A post drill, a double emery grinder, and a blower for the gas forge are driven from a separate motor. A laboratory for the special investigation of the physical and chemical properties of iron and steel is conveniently situated above the stock room, and a class room opens off the shop.

The *Electrical Engineering Laboratory* is on the third floor of the engineering building. Its function is to supplement the work of lecture and class rooms in training students in the principles of electrical engineering. The apparatus is typical rather than special, and represents the most recent practice. The equipment includes one 33 K. W. direct current motor and one 23 H. P. direct current motor, used for driving line shafting; twelve direct current motors, 5 K. W. and smaller; one 35 light arc dynamo; one 5 K. W. two phase alternator; one 6 K. W. two phase rotary converter; one 5 K. W. two and three phase rotary converter; one 7½ K. W. double current generator, two and three phase and direct current; one 2½ K. W. rotary converter for electrolytic work and welding, converting from 110 volts direct current to 8 volts direct current and 6 volts three phase alternating current; two 2 H. P. single phase induction motors; one 3 H. P. three phase induction motor; one 5 H. P. three phase variable speed induction motor with three phase secondary mounted on a cradle dynamometer, and available as an induction motor, generator, or regulator, as a three phase stationary transformer, or as a frequency changer; four 2½ K. W. transformers with 2 to 3 or 3 to 2 phase connections; four 5 K. W. transformers with a wide range of voltages; one 7½ K. W. welding transformer; one 5 K. W. 30,000 volt testing transformer with instruments; one constant current series arc transformer with lamps; one constant current arc regulator; apparatus for transforming from constant pressure to constant current; one condenser compensator; one 10 K. W. integrating polyphase wattmeter; artificial transmission lines; a large number of indicating instruments, resistances, reactances, etc.

The *Mechanical Laboratory* is located on the second floor and covers a floor space of fifty by sixty feet. The apparatus in this laboratory is concerned largely with mechanical transmission, efficiencies, and testing of instruments. In the equipment are various forms of transmission and absorption dynamometers, belt testing machine, Reeves variable speed counter shaft, steam engine indicator spring tester, fifty foot mercury column, deadweight oil gauge testers, lubricating oil testers, Chetalier pyrometer, smoke analysis apparatus, various forms of coal calorimeters, standard weights and thermometers. The motive power of this room is supplied by a 20 H. P. electric motor hung on a cradle dynamometer.

The *Strength of Materials Laboratory* occupies one-half of the first floor of the engineering building. It has an area of 3,000 square feet. The laboratory has a complete equipment for testing steel and other metals for ultimate resistance, elastic limit, etc., in tension, compression, and shear. It is also equipped for testing timber, cement, rope, etc. The principal machines installed are: A 200,000 pound Olsen, a 40,000 pound Riehle, a 1¼ inch by 4 foot Olsen torsion, a dynamograph for finding the machinability of materials, a Keep dead load, and a Keep impact for cast iron, and a 2,000 pound Fairbank current tester.

The *Steam Laboratory* is in the northwest corner of the basement of the main building, and covers about five thousand feet of floor space. It is fitted for a great variety of work in compressed air, ammonia, and steam. Included in its equipment are a 30 H. P. return flue boiler, arranged for natural or induced draft; a vertical pipe smoke economizer; a 7 by 12 straight line engine, capable of attachment to an Alden water brake, as well as the ordinary forms of brake; an experimental engine, arranged to take various forms of valve, easily changeable; a gas engine, capable of many adjustments and arranged with gas and air meters; a surface condenser with necessary weighing tanks; an air and ammonia compressor in connection with a half-ton refrigerating system; air tanks capable of withstanding 1,200 pounds pressure; five forms of injectors,

arranged for complete mechanical and heat efficiency tests; various pumps, calorimeters, indicators, etc.

The *Hydraulic Laboratory,* with a floor space of about 3,000 square feet, is located in the north end of the basement, engineering building. It is equipped with weighing tanks, pressure tanks, weir tanks, stand pipe, rotary and reciprocating pressure engines, water wheels, and motors, for the investigation of hydraulic machinery and the demonstration of the mechanics of hydraulics.

The Drawing Rooms.

The rooms for drawing and design are in the engineering building, four on the sixth floor, two on the fifth, and one on the fourth floor. They aggregate about five thousand square feet of floor space and are amply lighted and furnished. Their proximity to the foundry, pattern, and machine shops makes it possible to co-ordinate, to an unusual degree, the design and constructive branches.

The blue-print room is on the mezzanine floor above the sixth, and is approached through a drawing room on the sixth floor. It is equipped with a 40 by 52 inch curved glass blue-print machine, tracing files, blue-print baths, etc.

Tuition.

The rates of tuition for day students are ten dollars a quarter for one course of instruction, and twenty dollars for two or more courses.

The rates for night students are five dollars for a term of ten weeks for one course of instruction, two evenings a week, and ten dollars for two courses, four evenings a week.

Fees.

Day students, who register for more than one course of instruction, are required to pay a registration fee of five dollars.

Both day and night students, who take one or more shop or

laboratory courses in the departments of physics, chemistry, and engineering, are required to pay a fee of five dollars a quarter.

Students in chemistry deposit two dollars each to cover breakage. If the charges do not amount to two dollars, the excess is returned to the student.

Student Organizations.

There are numerous student organizations in the Institute, but all include some member or members of the faculty who act as sponsors for them. In addition to the social life thus provided, these societies afford chances for improvement in music, dramatic art, the study of classical antiquity, the conversational use of foreign languages, and special topics in engineering.

Scholarships.

Three scholarships have been established under the will of the late Mrs. Hugh A. White. Mr. John McLaren was named in the will to assign these scholarships.

Three additional scholarships are assigned by the Institute for excellence in public speaking.

Income and Expenses.

The income derived from the endowment and all receipts from tuition and other sources are used for the maintenance and advancement of the work of the Institute.

The School of Arts.

Admission.

Each candidate for admission is required to furnish a testimonial of honorable dismissal from the school last attended. He must also refer to two persons, preferably his teachers or employers, from whom information about him may be obtained.

Candidates from Chicago grammar schools and other schools of equal rank, who have completed satisfactorily the work of the eighth grade, may be admitted without examination, upon recommendation of the principal of the school from which they come. Application for admission should be made in person, upon one of the days set for the regular entrance examination.

Candidates for admission other than those mentioned above are examined as follows:

1. English. The candidate will be expected to write, neatly and legibly, a few paragraphs on one of several subjects assigned by the examiner. These subjects will require no special or "school" knowledge, but will draw upon the student's past experience of ordinary life. Because this is the fact, the candidate will be expected to spell correctly all the words he uses in his paper. He is advised to use no word concerning the spelling of which he is in doubt.

The candidate will further be expected to answer questions of average difficulty concerning English grammar, as treated in such a book as Kittredge and Arnold's The Mother Tongue, Part II, or Lewis's Applied English Grammar. Ability to understand the relations of the parts of a complex sentence to each other is a good indication of the degree of maturity required in the successful applicant.

2. Arithmetic. The examples set will be practical problems

in common and decimal fractions, common measures, and percentage as it is applied in ordinary business. Mental arithmetic from dictation will be a part of the examination, and both the facility and the accuracy of the candidate will be tested.

3. History of the United States. Pupils will be expected to know something of the settlement of North America; the Revolutionary War, the War of 1812, and the Civil War; the inventions that have favored trade and manufactures; compromises and legislation concerning State Rights and Slavery. Some knowledge will be required concerning the biography of famous Americans and concerning questions of the day.

4. Geography. The examinations will be given in the form of outline maps on which natural features, lines of communication, and other geographical facts are to be located. The pupil should have an accurate knowledge (1) of the location of the more important physical features (mountains, plains, seas, rivers, etc.); (2) of the important political subdivisions (countries, states and chief cities); (3) of the important natural resources; and (4) of commercial geography. In all these respects emphasis should be placed on the geography of North America and Europe.

Candidates for advanced standing are admitted upon presentation of certificates from Chicago high schools and other schools of equal rank, and are assigned to classes upon the basis of these certificates. Any such standing is regarded as probationary until confirmed by examination. The examinations are held during the first week of each school year, and take the form of recitations, oral and written, which determine the candidate's fitness to continue the work in the classes to which he has been assigned. The Institute reserves the right to revise such standing if it should appear that the student needs more time for preparation in any given subject.

Assignment of Studies.

A student on entering the Institute is assigned to such studies as seem to be best suited to his individual aims and needs as far as these can be determined from personal con-

sultation and from an examination of the record of work done elsewhere. This assignment is made for a term of three months and is revised each quarter in the light of the work of the preceding quarter. The progress a student makes depends on his own ability and application, and is quite independent of what others are doing.

Courses of Instruction and Credits.

Unless otherwise specified a course of instruction continues for twelve weeks with fifty-minute periods of class work, five days in the week.

The unit of credit is sixty hours.

The satisfactory completion of a course of instruction which requires 120 hours, counting time of preparation and recitation, or time devoted to laboratory, drawing, or shop work, entitles the student to two credits; 180 hours, to three credits.

The number of periods of class work required daily and the number of credits assigned to each course of instruction are shown in the Suggestive Curricula.

The Academic Certificate.

To obtain the Academic Certificate the student must receive 90 credits, of which 42 are prescribed as follows: English 18, algebra and geometry 12, foreign language 12. The remaining 48 credits are not elected by students, but are arranged for and planned with them with the view of helping them to make the best use of their time and talents and opportunities.

The Title of Associate in Arts.

To obtain the Title of Associate in Arts the student must secure 144 credits, of which 69 are prescribed as follows: English 21, mathematics 18, foreign languages 18, history 6, physics or chemistry 6; leaving 75 credits to be selected according to the varying needs of different students.

Suggestive Curricula.

On pages 28 and 29 four Suggestive Curricula are outlined, which are designed to suggest to patrons and students some of the various combinations of studies that may be made, and the order in which they may most profitably be taken. The first curriculum puts the emphasis on science and modern languages. The second is a modification of the first, designed to meet the needs of young women who specialize in domestic economy. The third and fourth are made up of such courses of instruction as are commonly required for the bachelor's degree in colleges of liberal arts.

Special Courses of Instruction.

As a rule, students are expected to take up the work of some one of the curricula outlined below, in which such choice of studies is allowed as is calculated to meet their needs. There may be those, however, who will be obliged to confine their work to one or two subjects of study. This may be done when the circumstances seem to justify it, subject to such conditions as may be imposed by the Director.

Standings and Reports.

At the end of the quarter reports are sent to parents or guardians showing the standings of students in the courses of instruction pursued. These standings are based on daily work and quarterly examinations. The parents of students who are not doing satisfactory work are notified in the middle of the quarter, and their co-operation is secured, when possible, through personal interviews.

Attendance and Discipline.

Prompt and regular attendance is expected of all students. When such attendance cannot be secured, and when it becomes apparent that the student is not profiting by his connection with

the Institute, his parents or guardians will be given an opportunity of withdrawing him, and if he is not withdrawn within a reasonable time, he will be dismissed.

Time Requirement.

The time required for the completion of the work of any one of the curricula will vary with different students, according to their ability, health, application, and time for study. Students whose school work has been in no way interrupted should be prepared for admission to the Institute at the age of fourteen years, and if able to give the working hours of the day to their school duties, they should complete the studies of any one of the curricula in six years.

Half-Day and Evening Courses.

Many boys and girls are obliged to leave school in order to take care of themselves and those dependent upon them, at a time when their more fortunate associates enter upon such courses of instruction as are herein outlined. Such as can attend the Institute but half of each day may, by prolonging the time requirement, complete the work of some one group of studies, or at least perfect themselves in one or more subjects. Provision has also been made for such instruction at night as enables young men and women who are employed during the entire day to continue their education along those lines which will be of the most service to them in the work in which they are engaged.

1. SCIENCE AND MODERN LANGUAGES.

Year.	Autumn Quarter.	Course No.	No. of Credits.	Hours in Class.	Winter Quarter.	Course No.	No. of Credits.	Hours in Class.	Spring Quarter.	Course No.	No. of Credits.	Hours in Class.
First.	English	1	2	1	English	2	2	1	English	3	2	1
	Mathematics	1	2	2	Mathematics	2	2	1	Mathematics	3	2	2
	Latin	1	2	1	Latin	2	2	2	Latin	3	2	1
	Physiography or	2	2	2	Physiography or	1	2	2	Physiography or	2	2	2
	Shopwork or	2	..	..	Shopwork or	2	..	..	Drawing or	2	..	..
	Drawing.	1	..	..	Domestic Economy	1	..	..	Domestic Economy	2	..	..
	Total	....	8	6	.....	....	8	6	.....	....	8	6
Second.	English	4	2	1	English	5	2	1	English	6	2	1
	Mathematics	4	2	1	Mathematics	5	2	2	Mathematics	6	2	1
	Latin	4	2	2	Latin	5	2	1	Latin	6	2	2
	History	1	2	1	History	2	2	1	History	3	2	1
	Total	....	8	5	.....	....	8	5	.....	....	8	5
Third.	Mathematics	12	3	1	History	5	3	1	History	6	3	1
	Physics	1	3	2	Physics	2	3	2	Physics	3	3	2
	German	1½	3	1	German	3	3	1	German	4½	3	1
	Total	....	9	4	.....	....	9	4	.....	....	9	4
Fourth.	English	7	3	1	English	8	3	1	Mathematics	10	3	1
	Chemistry	1	3	3	Chemistry	2	3	3	Chemistry	3	3	3
	German	7	3	1	German	8	3	1	German	9	3	1
	Total	....	9	5	.....	....	9	5	.....	....	9	5
Fifth.	English	9	3	1	English	10	3	1	English	11	3	1
	Chemistry	4	3	3	Chemistry	5	3	3	Chemistry	6	3	3
	French	1½	3	1	French	3	3	1	French	4½	3	1
	Total	....	9	5	.....	....	9	5	.....	....	9	5
Sixth.	History	7	3	1	History	8	3	1	History	9	3	1
	Biology	1	3	2	Biology	2	3	2	Biology	3	3	2
	French	7	3	1	French	8	3	1	French	9	3	1
	Total	....	9	4	.....	....	9	4	.....	....	9	4

2. * DOMESTIC ECONOMY.

Fifth.	English	9	3	1	English	10	3	1	English	11	3	1
	Chemistry	4	3	3	Chemistry	7	3	3	Chemistry	6	3	3
	Domestic Economy	D	2	2	Domestic Economy	E	2	2	Domestic Economy	F	2	2
	Total	....	8	6	.....	....	8	6	.....	....	8	6
Sixth.	Biology	1	3	2	Biology	2	3	2	Biology	3	3	2
	French	1½	3	1	French	3	3	1	Chemistry	19	3	1
	Domestic Economy	7	2	2	Domestic Economy	8	2	2	Domestic Economy	9	2	2
	Total	....	8	5	.....	....	8	5	.....	....	8	5

* For first four years, see Science and Modern Languages.

3. *LATIN AND MODERN LANGUAGES.

Year.	Autumn Quarter.	Course No.	No. of Credits.	Hours in Class.	Winter Quarter.	Course No.	No. of Credits.	Hours in Class.	Spring Quarter.	Course No.	No. of Credits.	Hours in Class.
Third.	Mathematics..	12	3	1	History.....	5	3	1	History.....	6	3	1
	Latin.....	7	3	1	Latin.....	8	3	1	Latin.....	9	3	1
	French.....	1½	3	1	French.....	3	3	1	French.....	4½	3	1
	Total.....	....	9	3	.....	....	9	3	.....	....	9	3
Fourth.	English.....	7	3	1	English.....	8	3	1	Mathematics..	10	3	1
	Latin.....	10	3	1	Latin.....	11	3	1	Latin.....	12	3	1
	French.....	7	3	1	French.....	8	3	1	French.....	9	3	1
	Total.....	....	9	3	.....	....	9	3	.....	....	9	3
Fifth.	English.....	9	3	1	English.....	10	3	1	Mathematics..	14	3	1
	Latin.....	13	3	1	Mathematics..	13	3	1	Latin.....	14	3	1
	German.....	1½	3	1	German.....	3	3	1	German.....	4½	3	1
	Total.....	....	9	3	.....	....	9	3	.....	....	9	3
Sixth.	English.....	11	3	1	Latin.....	15	3	1	English.....	12	3	1
	Physics.....	1	3	2	Physics.....	2	3	2	Physics.....	3	3	2
	German.....	7	3	1	German.....	8	3	1	German.....	9	3	1
	Total.....	....	9	4	.....	....	9	4	.....	....	9	4

4. *LATIN AND GREEK.

Third.	Mathematics..	12	3	1	History.....	5	3	1	History.....	6	3	1
	Latin.....	7	3	1	Latin.....	8	3	1	Latin.....	9	3	1
	Greek.....	1	3	1	Greek.....	2	3	1	Greek.....	3	3	1
	Total.....	....	9	3	.....	....	9	3	.....	....	9	3
Fourth.	English.....	7	3	1	English.....	8	3	1	Mathematics..	10	3	1
	Latin.....	10	3	1	Latin.....	11	3	1	Latin.....	12	3	1
	Greek.....	4	3	1	Greek.....	5	3	1	Greek.....	6	3	1
	Total.....	....	9	3	.....	....	9	3	.....	....	9	3
Fifth.	English.....	9	3	1	English.....	10	3	1	English.....	11	3	1
	Mathematics..	13	3	1	Mathematics..	14	3	1	Latin.....	14	3	1
	Latin.....	13	3	1	Greek.....	8	3	1	Greek.....	10	3	1
	Total.....	....	9	3	.....	....	9	3	.....	....	9	3
Sixth.	Greek.....	9	3	1	Latin.....	15	3	1	English.....	12	3	1
	Physics.....	1	3	2	Physics.....	2	3	2	Physics.....	3	3	2
	German.....	1½	3	1	German.....	3	3	1	German.....	4½	3	1
	Total.....	....	9	4	.....	....	9	4	.....	....	9	4

*** For first and second years, see Science and Modern Languages.**

Courses of Instruction in the School of Arts.

English.

Instruction is offered in English grammar, composition, oral reading, public speaking, and literature.

The historical grammar of English is not presented formally at any point in the course, but daily drill is given in matters of correct conversational usage.

In the teaching of composition the aim is to develop in the student the largest possible amount of practical power — the ability to present his own thoughts in clear and orderly fashion.

Throughout the course practice is given in oral reading. No attempt is made to cultivate the elocutionary graces. Simple and intelligent reading is found to be an end sufficiently difficult to attain.

Throughout the course practice is given in public speaking. The pupil is expected to face the class and speak to it with simplicity and directness. He is urged to choose topics in connection with which he can appeal to his audience for definite action.

In most of the literary courses, masterpieces are chosen and presented with reference to the ascertained interests and ideals of the student. In courses 7 and 8 this principle is subordinated to the "uniform college entrance requirements."

In courses 1-6 the regular text-books at present used are as follows: Lewis, First Manual of Composition, revised edition; Lewis, Introduction to the Study of Literature; Peabody, Old Greek Stories; Shakspere, The Merchant of Venice, edited by Miss Underwood; and numbers 21, 40, 27, 37, 133 in the Riverside Literature Series, being selections from Franklin, Hawthorne, Thoreau, and Warner, with Schurz's Life of Lincoln. These books are referred to below by abbreviations.

1.* (2) The chief object of Course 1 is correctness in speaking and

*The figure in parenthesis indicates the number of credits that are given for the course. For definition of credit and course see page 25.

writing English. Average sections cover First Manual, Chap. I., and Peabody. Special sections omit Peabody and receive more drill in correctness.

2. (2) Average sections cover First Manual, Chap. II., and Introduction, I.-V. Special sections take fewer chapters of literature and more drill in correctness.

3. (2) Average sections cover First Manual, III., and Introduction, VI.-X. Special sections abbreviate Introduction.

4. (2) Average sections cover First Manual, IV., Franklin (2), Hawthorne (40), and Thoreau (27). Special sections omit 21 or 27, or both.

5. (2) Average sections cover First Manual, V., Schurz's Lincoln (133), and Warner (37). Special sections omit 37.

6. (2) Average sections cover First Manual, VI., and Merchant of Venice. Special sections omit Merchant of Venice.

1-6. COMPOSITION. Students who for whatever reason have not attained the degree of correctness required for entrance to course 7 are assigned to course 1-6, which amounts to a review of all preceding work in writing and speaking English.

7. (3) LITERATURE AND COMPOSITION. The following masterpieces will be studied in 1904-1905: Shakspere's *Macbeth;* Milton's *L'Allegro, Il Penseroso, Comus, and Lycidas;* Burke's *Speech on Canciliation with the American Colonies;* Macaulay's *Essay on Milton* and *Essay on Addison.*

8. (3) LITERATURE AND COMPOSITION. The following masterpieces will be read in 1904-1905: Shakspere's *Merchant of Venice* and *Julius Cæsar;* Addison's *Sir Roger de Coverley Papers;* Goldsmith's *The Vicar of Wakefield;* Coleridge's *The Ancient Mariner;* Scott's *Ivanhoe;* Carlyle's *Essay on Burns;* Tennyson's *The Princess;* Lowell's *The Vision of Sir Launfal;* George Eliot's *Silas Marner.*

1-8. COMPOSITION. Students who for whatever reason have not attained the degree of facility and correctness required for entrance to course 9 are assigned to course 1-8. The work is based on Lewis's Second Manual of Composition. All students are advised to take this course; a large number are required to take it.

9. (3) RHETORIC AND ENGLISH COMPOSITION. This course lays stress upon the structure of the whole composition, the paragraph, and the sentence. It affords practice in writing by twelve themes, illustrating the following species: Narration, description, translation, summary, exposition, argument.

10. (3) ENGLISH LITERATURE AND COMPOSITION. This course is intended to serve as an introduction to the theory of literature; but on the principle that sane criticism presupposes an intimate knowledge of facts, a considerable body of English poetry is required to be committed to

memory. Almost daily written work is required, in the form of brief criticisms and interpretations.

11. (3) ENGLISH COMPOSITION. The object of this course is threefold: To give a more technical theory of composition than that of course 9; to afford some practice in the construction of long themes, and to secure fluency by daily themes illustrating many types. Much personal consultation is required.

12. (3) SHAKSPERE. In 1903-1904, Dowden's Shakspere Primer and the following plays were read: *Romeo and Juliet, Henry IV. (Part I.), Twelfth Night, Hamlet, King Lear, Antony and Cleopatra, Coriolanus, The Winter's Tale, The Tempest.*

13. (3) THE ENGLISH ESSAY. A rapid survey is attempted of the history of the essay as an exponent of life and thought, particularly that of the present century. The authors studied in 1903-04 were Bacon, Browne, Hazlitt, Lamb, Landor, Newman, Carlyle, Emerson, Ruskin, Arnold, Stevenson.

14. PUBLIC SPEAKING. In conection with courses 9-11 a total of fifty short speeches is required of every student, over and above the regular work of these courses.

15. VOICE CULTURE. The aims of this course are three: to improve the health of students by proper training of the voice and the respiratory organs; to supplement the work in public speaking; and to correct such faults of address as hinder success in practical life.

History.

The work in history, as outlined below, is designed to secure two results: first, a knowledge of the important facts of history; and second, the discipline and training that come from the nature of the subject-matter studied. In all courses special attention is given to correct methods of study and to the orderly arrangement and causal nexus of historical facts as a basis for subsequent work.

The courses are arranged in four divisions, each division consisting of work for two quarters. The first three are Ancient history, English history, and the history of the United States with especial attention to the development of the national government. These three divisions afford an opportunity for two years' continuous work in history. The fourth division, comprising work for three quarters, has for its subject-matter the history of western Europe from the decadence of the Roman Empire to modern times, and is open to students who have completed the first and second or first and third of the previous divisions.

1. (2) HISTORY OF GREECE. In this course emphasis is placed upon the period of Greek history from the Persian wars to the Roman con-

quest, and upon those features of Greek life and civilization which became the common property of the East and of Rome.

2. (2) History of Rome. The early Republic, the territorial expansion and political development of Rome, the causes of the fall of the Republic, the earlier and later Empire form the subject-matter of the course. As far as possible, the time is divided equally between the Republic and the Empire.

3. (2) History of England. This course covers the period of English history to the accession of George III., with something of the history of the English colonies in America as a part of the expansion of the English nation.

4. (3) History of England. The subject-matter of this course is the history of England from the beginning of the Puritan movement to the present time. Special and intensive work is done upon selected topics and periods. Prerequisite: *Course 3.*

5. (3) History of the United States. The course includes the colonial period; the progress of the colonies toward independence and union; the growth of the constitution, and the history of government under the constitution to the close of the Federalist administrations.

6. (3) History of the United States during the nineteenth century, with especial attention to the working of the constitution, the growth of political parties, and the industrial development of the country.

7. (3) Europe from the Fourth to the Fourteenth Century. An outline course in general European history covering the period from the Council of Nicea to the removal of the Papacy to Avignon, treating in such detail as the time will permit the civilization and institutions peculiar to the period.

8. (3) Europe from the Fourteenth to the Eighteenth Century. From the exile to Avignon to the close of the Seven Years' War. An outline study of the Renaissance, Reformation, Counter Reformation, Religious and Dynastic wars, and the struggle for colonial and commercial supremacy.

9. (3) Europe since 1763. The effect of the American Revolution on Europe, attempts at reform, the French Revolution, Napoleon, the Holy Alliance, reforms in England, and the unity of Germany and Italy are some of the subjects that will be considered in the course.

Mathematics.

A continuous and progressive course in pure mathematics for five years is offered, an outline of which is given below.

In the third year of the course, when students have some knowledge of elementary algebra, plane geometry, and trigonometry, ample opportunity is given to apply their knowledge in the study of physics; and in

the sixth year students in engineering will have abundant use for their knowledge of mathematics obtained during the five years preceding.

Both the disciplinary and the practical purposes of mathematics are kept in view, and an earnest attempt is made to give due emphasis to each.

By repetition and reviews, it is believed, facility in the ready and masterly use of mathematics may be obtained, and the course, as a whole, has been planned with this purpose in view. Thus algebra is introduced in three distinct places in the course, geometry in three, trigonometry in two.

1. (2) ELEMENTARY ALGEBRA. Definitions and notations, positive and negative numbers, addition and subtraction of algebraic expressions, parentheses, multiplication, and division, simple equations, factoring, highest common divisor, lowest common multiple.

2. (2) ELEMENTARY ALGEBRA, four days a week. Fractions, simple equations containing fractions, simple simultaneous equations, inequalities, involution and evolution. CONCRETE GEOMETRY one day a week.

3. (2) ELEMENTARY ALGEBRA, four days a week. Theory of exponents, radicals, quadratic equations, simultaneous equations involving quadratics, theory of quadratic equations, ratio and proportion. CONCRETE GEOMETRY one day a week.

4. (2) PLANE GEOMETRY. Elementary definitions, triangles, parallels, parallelograms, problems, loci of points. The geometric concepts should have been well fixed in mind during the two preceding quarters. In this course the emphasis is to be placed on the logical demonstration of the theorems, and solutions of problems.

5. (2) PLANE GEOMETRY. Equality of polygons, circles, inscribed and circumscribed triangles and quadrilaterals, ratio and proportion. Especial emphasis is placed on original exercises.

6. (2) PLANE GEOMETRY, completed. The last four or five weeks of the quarter will be devoted to an elementary presentation of some of the most useful and fundamental facts of Plane Trigonometry.

6a. (3) SURVEYING. This course includes practical work with surveying instruments.

7. (2) ACCOUNTING. A study of common and decimal fractions, addition, percentage, discounts, commission, insurance, exchange bills, settlements, averaging accounts, and profit and loss. Special work in mental calculations.

8. (2) ACCOUNTING. Introduction and use of main books used in accounting, and application of principles learned in course 7 to business transactions recorded in them. Exercises in opening and closing books, and practice in writing business papers.

9. (2) ACCOUNTING. The continued use of main books and the introduction of auxiliary books. A study of partnerships with methods

of keeping accounts; adjusting profits and losses, making settlements and summarizing results. Business correspondence.

9a. (2) ACCOUNTING. Short methods; accounts of corporations, issue and transfers of stock, assessments and dividends. Banking business so far as is necessary to give the student an understanding of the position taken by a bank in business economy, and to enable him to deal intelligently with relations between a business house and a bank.

10. (3) ELEMENTARY ALGEBRA, *reviewed and completed.* A review and more thorough study of the fundamental operations. The solution of equations, the theory of exponents and surds. Theory of quadratic equations, indeterminate equations of the first degree, inequalities, ratio and proportion, progressions.

11. PLANE GEOMETRY, *reviewed,* with special emphasis on original problems and demonstrations. This course is not required of students who have completed courses 4, 5, and 6.

12. (3) SOLID GEOMETRY. Lines and planes in space, pencil of planes, polyhedral angles, polyhedra, parallelopipeds, prisms and pyramids, the cylinder, cone, and sphere, similar solids.

13. (3) ALGEBRA. Permutations and combinations, the binomial theorem, limiting values and vanishing fractions, convergency and divergency of series, undetermined coefficients, summation of series, introduction to the theory of equations.

14. (3) TRIGONOMETRY. Plane trigonometry, with an introduction to spherical trigonometry.

15. (3) PLANE ANALYTICAL GEOMETRY. Systems of co-ordinates; the equations and properties of the point, straight line, circle, parabola, ellipse, and hyperbola; the general equation of the second degree.

16. (3) DIFFERENTIAL CALCULUS. The elements of differential calculus.

17. (3) INTEGRAL CALCULUS. The elements of integral calculus.

18. (3) APPLIED CALCULUS. Applications of calculus to the integrations most frequently required in engineering subjects; intended to familiarize the student with the use of calculus as a practical instrument in mechanics, thermodynamics, and electricity.

Physiography.

In the courses in physiography and geology, lectures, recitations, and laboratory methods of work are used. The student is not confined to a single text-book, but is required to consult different authors. Maps, charts, and lantern views are freely used, and the students are encouraged to draw upon their store of mental pictures of familiar landscapes. So far as possible general principles are deduced from the facts thus brought out. Each pupil is required to give definite expression to his

ideas through recitations, written descriptions, sketches, and diagrams, and by moulding in sand. Opportunities are afforded for field excursions under the guidance of the instructor. The aim of the instruction is the training of the powers of observation and reasoning, as well as the acquisition of useful information. To aid in the carrying out of this plan, the department possesses a large assortment of topographical maps, geological maps, coast and river survey charts, relief models, weather maps, lantern views, facilities for moulding the land forms, and the more important books of reference.

1. (2) PHYSIOGRAPHY. The motion of the earth and its relation to the sun and moon; elementary meteorology and climatology; distribution, movements, and deposits of the ocean.

2. (2) PHYSIOGRAPHY. The land: The modern doctrines of the origin and development of the surface features of the earth, the agencies involved, and the resulting forms are carefully studied and classified. A limited number of field excursions are made.

Course 2 may precede or follow course 1, according as the work is commenced in the autumn or winter.

4. (3) GENERAL GEOLOGY. The elementary features of dynamical, structural, and historical geology. Emphasis is placed upon the leading facts and principles of the science, and the more important events of geological history. Prerequisite: *Courses 1 and 2; Physics 1-3 and Chemistry 1-3, or their equivalent.*

5. (3) PHYSIOGRAPHY AND COMMERCIAL GEOGRAPHY OF THE UNITED STATES. A study of the physiographic features of the United States, with reference not only to their present form, but also to the successive stages of their development, and their effect upon mankind; the effect of natural resources and physiographical features on the location of cities and in determining the industries, the lines of transportation, and the prosperity of the people. Lectures, recitations, library and laboratory work. Prerequisite: *Courses 1, 2, and 4, or their equivalent.*

6. (3) METEOROLOGY. Observational study of atmospheric phenomena supplemented by lectures, recitations, and reference work, by which an intelligent comprehension of the facts and theories of the science is gained. A part of the observational work will be done in connection with courses 4 and 5.

Courses 4, 5, and 6 are designed to afford a continuous year's work in the study of the earth, and should be elected as a unit.

Physics.

The work of the department consists of courses in general physics, together with special courses for students in engineering.

The design of the courses in general physics is to familiarize stu-

dents with the principles of physics, and to cultivate correct methods of laboratory work, and also to serve as an introduction to applied mathematics. Attention is given to the preparation of records, to the manipulation of apparatus, and to the cultivation of the patience necessary to secure the best results.

The advanced courses may not be taken until the student has had such work in mathematics as will enable him to solve the problems that arise in lecture discussion and detailed laboratory practice. These courses are designed for students who intend to specialize in physical science or in engineering.

1. (3) GENERAL PHYSICS. Mechanics: A discussion and illustration of physical quantities and their measurement; simple types of motion; density, velocity, acceleration, force, work, power and efficiency, elasticity, and surface tension.

LABORATORY PHYSICS. Strictly quantitative, covering subjects named above.

2. (3) GENERAL PHYSICS. Heat: Thermometer, expansion, calorimetry, change of state, solutions, transference of heat, and theory of gases. Sound: Waves, sounds and their relations, sonorous bodies, compound tones and musical instruments. Light: Nature and propagation, reflection, refraction, theory of optical instruments, interference, dispersion, radiation and absorption of light waves, color, and polarization.

LABORATORY PHYSICS. Quantitative work in heat, sound, and light.

3. (3) GENERAL PHYSICS. Electricity: Electrification, the electric field, electrostatic instruments, electric discharges, magnetism; the electric current, the electromagnetic field, relations between heat and electricity, units, telegraph and telephone, and electric waves.

LABORATORY PHYSICS. Quantitative measurements of current, electromotive force and resistance; testing batteries of incandescent lamps, arc lamps, motors and generators, calibration of instruments.

4. (3) MECHANICS: Standard units; dimensions of dynamical units; properties of matter; measurements of precision in length, mass, and time; kinematics; statics; dynamics; special problems. Prerequisite: *Mathematics 14.*

5. (3) HEAT AND LIGHT: Calorimetry; radiation, conduction; thermodynamics; kinetic theory of gases; kinds of vibration; media of propagation; measurement of light waves; interference, reflection, and refraction of waves; photometry; special problems for advanced students. Prerequisite: *Mathematics 14.*

6. (3) ELECTRICAL MEASUREMENTS: Magnetism; magnetic units; measurement of earth's field; electrostatics; electromagnetism; electromagnetic units; electrodynamics; measurement of resistance, current, electromotive force, quantity, capacity and temperature coefficients; cali-

bration of instruments; electromagnetic theory of light. Prerequisite: *Mathematics 14.*

7. (3) ADVANCED ELECTRICAL MEASUREMENTS: Continuation of course 6. Temperature coefficients; quantity and capacity; self and mutual induction; permeability and hysteresis of iron and steel; calibration of commercial instruments; wireless telegraphy apparatus. Latitude will be allowed the student in choosing any special line of investigation which he wishes to pursue. Prerequisite: *Course 6.*

8. (3) PRIMARY AND SECONDARY BATTERIES: Historical development; modern theories; reactions; uses of different types; complete tests of primary and storage cells; care and maintenance. Prerequisite: *Course 6 and Chemistry, 1.*

9. (3) ELECTRO-METALLURGY. Testing of primary and secondary batteries; electroplating; resistance of electrolytes; Faraday's laws; special investigations in electrolysis. Prerequisite: *Course 8 and Chemistry, 1.*

10. THEORIES OF PHYSICS. Advanced course in heat, sound, or light, supplemented by research work in the laboratory. Prerequisite: *Course 8 and Mathematics 17.*

Chemistry.

The aim of the courses in chemistry is to give in the first place a knowledge of the fundamental principles of the science as a part of a general education; and afterwards a more extended knowledge of the subject and practice in manipulation to those who wish to devote themselves to pure or applied chemistry, or whose work along other lines will be made more efficient by a thorough training in chemistry. In the advanced work in chemistry a reading knowledge of German is assumed. Engineering students are encouraged to become familiar with the principles on which manufacturing processes or industrial methods are based, so that a firm foundation is laid for subsequent specialization in these directions. Opportunities are given for excursions to the plants of chemical industries located in and near Chicago.

All students taking courses in chemistry are required to deposit two dollars each quarter to cover charges for breakage. If the charges do not amount to the sum deposited, the excess is returned to the student.

The courses in elementary chemistry aim to develop the reasoning and observational powers of the student on scientific lines, and lead him by actual experiment to acquire a knowledge of the more important substances, possessing an economic interest, that are encountered in daily life. Most of the time is devoted to laboratory work, the recitations being chiefly utilized for systematizing the results thus obtained.

Lectures and recitations, four hours a week; laboratory work, six hours a week.

A. (2) ELEMENTARY CHEMISTRY. General introduction; physical and chemical properties characteristic of the states of matter; chemical separation: water, air, etc.

B. (2) ELEMENTARY CHEMISTRY. Continuation of Course A. Study of some of the non-metals and their more important compounds.

C. (2) ELEMENTARY CHEMISTRY. Continuation of Course B. Completion of the non-metals. Introduction to some of the more important metals.

The courses in general chemistry give a knowledge of the natural occurrence, methods of preparation, properties and reactions of the important elements and compounds, explain these facts according to modern theories, point out their application to industrial processes. Instruction is given by means of lectures and recitations, illustrated by experiments whenever advantageous. In connection with each subject studied the student is required to read some standard work. The greater part of the laboratory work is qualitative, but it includes quantitative experiments involving both gravimetric and volumetric methods, and also a few inorganic preparations on a somewhat elaborate scale. Lectures and recitations, five hours a week; laboratory work, ten hours a week. Reference book, Newth's Inorganic Chemistry. Prerequisite: *Courses A-C or Physics 1-3.*

1. (3) GENERAL CHEMISTRY. Chemical change, three states of matter, solution and crystallization, elements and compounds, oxygen, hydrogen, and the elements of the chlorine group.

2. (3) GENERAL CHEMISTRY. Continuation of course 1. The remaining non-metallic elements; acids, bases, and salts; electrolysis.

3. (3) GENERAL CHEMISTRY. Continuation of course 2. The metals. Qualitative analysis is not taught, but some of the more important analytical reactions are studied, so that at the end of the course the student is expected to be able to recognize any simple salt and to understand the methods of separation of various groups and elements.

The work in chemistry of the second year begins with course 4, one quarter of qualitative analysis given in the fall. This course is prerequisite to all more advanced work. At the beginning of the Winter Quarter the students are divided into three groups. Those intending to pursue chemical studies beyond this year take courses 5 and 6, advanced qualitative and beginning quantitative. Those preparing for medicine or domestic economy, and those who wish a more general knowledge, take courses 7 and 8, organic chemistry. Engineering students take courses 6 and 9, quantitative analysis of engineering materials.

The courses in qualitative analysis begin with simple analysis and lead to the study of complex mixtures, minerals, alloys, etc. They

include the methods of the recognition of the more common organic acids, and of various other substances of special interest and importance to medical students, together with toxicological work. The lectures treat in considerable detail of certain selected portions of theoretical and physical chemistry, special reference being made to the basis of analytical chemistry. Laboratory work, twelve hours a week; lectures and recitations, three hours a week. Text-book, Prescott and Johnson's Qualitative Analysis. Prerequisite: *Courses 1-3.*

4. (3) QUALITATIVE ANALYSIS. Lectures on the theory of analysis. General analysis, including that of complex mixtures and minerals.

5. (3) QUALITATIVE ANALYSIS. Continuation of course 4. Analysis of alloys, etc. Toxocological methods. Lectures on theoretical chemistry.

The courses in organic chemistry consist of lectures and recitations on the simpler types of carbon compounds, and their preparation and purification in the laboratory. Lectures and recitations, three hours a week; laboratory work, twelve hours a week. Prerequisite: *Courses 1, 2, 3, and 4.*

7. (3) ORGANIC CHEMISTRY.. The work is based on Perkin and Kipping's Organic Chemistry. Aliphatic series.

8. (3) ORGANIC CHEMISTRY. Continuation of course 7. Aromatic series.

The courses in quantitative analysis include exercises in gravimetric, volumetric, and electrolytic methods and gas analysis. Theoretical work consists of lectures and recitations on physical chemistry in course 6, and of reading advanced works on general and historical chemistry in courses 9 and following. Courses 10-19 are special courses designed to meet the needs of those who wish to become familiar with the analytical methods employed in regulating the manufacture and determining the purity and value of the substances indicated. The laboratory work in each course is supplemented by the reading of special works treating of the respective subjects. Course 9 is prerequisite to all that follow, and courses 7 and 8 to courses 17-19. Laboratory work, twelve hours; lectures and recitations, three hours a week.

6. (3) QUANTITATIVE ANALYSIS. Continuation of course 5. Simple gravimetric and volumetric determinations leading to course 9. Lectures and recitations on quantitative analysis.

9. (3) QUANTITATIVE ANALYSIS. Moderately complex separations, volumetric precipitations, and oxidation and reduction.

10. (3) IRON AND STEEL ANALYSIS. Including the microscopic structure.

11. (3) IRON ORE ANALYSIS.

12. (3) WATER ANALYSIS. Analysis of drinking water and of boiler feed water, including the analysis of boiler scale.

13. (3) FUEL ANALYSIS. Especially the analysis of coke and coal, including calorific determinations.

14. (3) GAS ANALYSIS. Including both flue gas analysis and illuminating and fuel gas analysis.

15. (3) CEMENT ANALYSIS. Including materials and finished product.

16. (3) COMPLEX MINERAL ANALYSIS. Including silicates, ores, and rare elements.

17. (3) OIL AND SOAP ANALYSIS. Analysis of oils, lubricators, and soaps.

18. (3) PAINT ANALYSIS. Including oils, varnishes, and pigments.

19. (3) FOOD ANALYSIS. The testing of foods for quality and purity.

Biology.

1. (3) GENERAL BIOLOGY. Classification of biological sciences; physical basis of life; protoplasm, cells, tissues, organs. Classification and distribution of animals and plants. Development, reproduction, evolution, heredity. The laboratory work will consist of the macroscopic and microscopic study and drawing of representative animals and plants. Prerequisite: *Physics 1-3 and Chemistry 1-3.*

2. (3) COMPARATIVE ANATOMY. After a brief study of invertebrate anatomy, the comparative anatomy and evolution of vertebrates will be considered in detail. In the laboratory representative vertebrates will be dissected. Prerequisite: *Course 1.*

3. (3) GENERAL PHYSIOLOGY. Physiology of unicellular organisms; irritability, nutrition, movement, cell division. Physiology of multicellular organisms; digestion, nutrition, secretion, circulation, respiration, animal heat, physiology of sense organs, central nervous system and muscles. Prerequisite: *Course 2.*

(For Hygiene and Bacteriology, see Domestic Economy, Courses 7-9.)

Philosophy.

The work in Philosophy is intended to give a general outline of the field of Psychology, Logic, and Ethics, and at the same time to make the student acquainted with the methods and problems of Philosophy.

The work will be carried on by means of text-books, recitations, and lectures. Collateral reading from standard authors will form the basis for written theses by the student.

1. (3) PSYCHOLOGY. A description and analysis of the fundamental processes of the mental life, with emphasis on their physiological aspects. James's Psychology, briefer course, will be used as a text-book, with assigned readings from other works.

2. (3) LOGIC. The basis of the course will consist of a study of conception, judgment, and reasoning in formal logic; but some of the wider applications of logic, such as the relation of language and thought, and the purpose of the thinking process, will be studied.

3. (3) ETHICS. The aim of the course is to acquaint the student with the important ethical theories, and their bearings upon the ideal of conduct and life. The student will be expected to compare and criticize the different points of view to forming an independent opinion.

Latin.

The course of study in this department includes, in addition to the usual four years of training preparatory for college, all the work in Latin regularly required in the best colleges for the degree of A. B. The courses are planned with a view to the student's progressive development, and the acquisition of a constantly increasing grasp of the language which shall enable him to read Latin with understanding and comparative ease and, in the later years of his course, with some amount of literary appreciation of the authors read.

Correct pronunciation with special regard to quantity is insisted upon from the beginning, so that by the time the student has reached the study of Latin poetry the hexameter should present little or no difficulty. In the acquisition of a vocabulary emphasis is laid upon the grouping of related words. Grammatical accuracy and familiarity with the principles of the language are sought rather through careful and constant practice in reading and writing Latin than by the memorizing of abstract rules.

With a view to the development of speed and facility in reading special attention is paid to translating at sight and hearing, and to the practice of reading aloud in the Latin with a proper appreciation of the sense of the author. Translation from Latin into English is from the beginning regarded as a part of the student's work in English composition, and the careless or distorted use of English resulting from literal translation is not allowed. The translation of English into Latin forms an important part of every course, exercises being based in the main upon the text read, but in the later years simple English narrative is substituted. Literature is studied historically as an expression of the life of the people and with reference to the times and the circumstances under which the writers lived, and in the more advanced classes attention is paid to the elements of style and of literary criticism. Systematic supplementary reading is encouraged, for which ample opportunity is offered by a carefully selected library. The work of the classes is supplemented by stereopticon lectures illustrating the monuments of Rome, Roman antiquities, historical sites, and Roman private life.

1, 2. (4) ELEMENTARY LATIN. The student is introduced to the main principles of the Latin language by a series of graded exercises, intended to render him familiar with the elements of Latin grammar and syntax through their use in the Latin sentence rather than by memorizing abstract rules. Special attention is paid at the outset to correct pronunciation and the training of the ear.

3. (2) ELEMENTARY LATIN. The reading of easy Latin and an outline study of Roman history to the time of the Empire.

4, 5. (4) CÆSAR, DE BELLO GALLICO. The Helvetian War, I, 1-29; The Belgian War, II; War with the Veneti, III, 7-16; Attack on Winter Quarters, V, 1-7, 24-55. For rapid reading, The General Uprising in Gaul, VII, 1-31, 34-36, 41, 44-53, 63-90, or Cæsar's Invasion of Britain, IV, 20-36, V, 1-23.

6. (2) SELECTIONS FROM NEPOS AND CÆSAR.

7, 8. (6) CICERO, ORATIONS AGAINST CATILINE. SALLUST, CATILINE. The orations of Cicero and Sallust's Catiline will form the basis of a study of the political and social conditions in Rome at the end of the Republic. That the student may feel in the Latin the spirit of the orations there will be frequent drill in reading aloud. In the work of Latin writing special attention is paid during these two quarters to the writing of continuous narratives.

9. (3) CICERO. PRO ARCHIA; PRO MARCELLO; SELECTED LETTERS. Prose writing as in courses 7 and 8.

10. (3) VIRGIL, ÆNEID, I, II. Special care is here given to the literary quality of the student's translations, and written translations of long passages are required. Formal drills in grammar are kept in the background so as to hinder as little as possible the student's interest in the story. Translations at sight, and weekly exercises in Latin writing.

11. (3) VIRGIL, ÆNEID, III, IV. This course is a continuation of Course 10.

12. (3) VIRGIL, ÆNEID, V, VI. Selections from Latin poetry. General review. Latin writing.

13. (3) CICERO, DE SENECTUTE. LIVY, Books XXI and XXII. Latin writing. Collateral reading upon Roman history.

14. (3) TACITUS, GERMANIA AND AGRICOLA. PLAUTUS, CAPTIVI OR TERENCE, PHORMIO. Latin writing. The history of Latin comedy. In connection with the study of the Germania, the accounts of early Teutonic institutions, given by Tacitus and Cæsar, will be compared.

15. (3) HORACE, SELECTIONS FROM THE ODES AND SATIRES. Collateral reading upon the history and literature of Rome in the time of Horace.

16. (3) ROMAN PRIVATE LIFE. A systematic treatment of the life of the Romans with special reference to the first century of the Empire. The course will consist of lectures by the instructor (two days a week),

illustrated by stereopticon views, and the reading of Pliny's Letters (three days a week). Each student will be expected to prepare, during the quarter, a paper on some social topic.

17. (3) SELECTIONS FROM JUVENAL OR TACITUS. Outline study of the history of Latin literature.

Greek.

The following notes will indicate, somewhat in detail, the methods and the aims of the work in Greek, in courses 1-6.

1. With a view to the acquisition of a comprehensive vocabulary, special attention is given to the grouping of related words and to the memorizing of the various meanings of all the common words.

2. Reading at sight and from hearing form an important part of the instruction from the first.

3. A correct and fluent pronunciation of the Greek sentence is insisted on.

4. Exercises in prose on the text read are prepared for each recitation in Attic Greek. This work is supplemented by frequent tests in writing Greek without previous preparation.

5. As soon as possible an effort is made to develop in the student, by means of essays and discussions, an appreciation of the historical and literary value of what he reads.

Courses 8-12 have been outlined and are conducted with special reference to the interests both of those students who wish a general training in Greek before proceeding to specialize in other lines of work, and of those who intend to make Greek the foundation or center of future specialization. It is believed that the courses offered, together with collateral reading and with discussions in the class room, will give a fairly broad idea of the scope of Greek literature and an appreciation of the relation of Greek to modern life and thought.

A careful review of the inflection and rules of syntax is made in connection with the study of Lysias. In all courses, particular attention is directed to sight reading and to the extension of the student's vocabulary, the aim being to cultivate the power to read rapidly at sight.

1. (3) ELEMENTARY GREEK. Emphasis is placed on the necessity of thoroughly mastering the essentials of the grammar. The fact that the student has had at least two years' training in Latin enables him to observe the similarities and differences between Latin and Greek, the value of this comparative study being that it makes the new language appear less strange and thus contributes materially to the learner's progress. The correct placing of accents and breathings is gained by constant practice in writing Greek.

2. (3) ELEMENTARY GREEK. Anabasis, Book I, chapters 1-3. Composition; grammar. The modification of verbal stems, euphonic changes, and drill in the principal parts of irregular verbs claim special attention. The student's observation is directed to the principles of composition and derivation as an important aid in acquiring a vocabulary.

3. (3) THE ANABASIS, Books I, II (except I: 9 and II: 6). Greek writing; grammar. A review is made of the work of the preceding courses. Reading from sight and from hearing is emphasized.

4. (3) THE ANABASIS, Books III, IV, I: 9, II: 6. Greek writing. Reading at sight and from hearing of selections from Book V. Discussion of literary and historical questions arising in connection with the reading of the Anabasis. Xenophon's life and literary work.

5. (3) HOMER, THE ILIAD, Books I, II, and III. The essentials of the structure of Homeric verse and the resemblances and differences between the Homeric and Virgilian hexameter are noted. The relation of the Epic to the Attic Greek and the essentials of Homeric syntax receive special attention. The study of words. Exercises in reading Attic Greek and in writing Greek.

6. (3) HOMER, THE ILIAD, Books VI, XXII, and XXIV; exercises in the writing of Greek. Some attention is given to the "Homeric Question," which is more fully discussed in Course 9.

8. (3) LYSIAS. Eight orations. HERODOTUS, Selections from Books VI and VII. Review of inflections and syntax. Composition. Collateral reading on history and on political antiquities. The rise of Attic oratory.

9. (3) HOMER, THE ODYSSEY, Books I-XIII. The study of words. The "Homeric Question." Comparison of Homer and Virgil.

10. (3) PLATO, APOLOGY AND CRITO. XENOPHON, MEMORABILIA. Greek writing. Readings and discussions on (1) the rise of Greek philosophy, (2) Socrates and the Sophists, and (3) Plato and Socrates.

10a. (3) XENOPHON, SYMPOSIUM. PLATO, SELECTIONS FROM THE PROTAGORAS, GORGIAS, EUTHYDEMUS, AND REPUBLIC. The writing of Greek. Collateral reading. (Alternates with course 10.)

11. (3) SELECTIONS FROM LUCIAN, DEMOSTHENES, PHILLIPPICS. Lucian and his times. The development of Attic oratory. Demosthenes's importance in Greek literature and history.

12. (3) SOPHOCLES, THE ANTIGONE AND ŒDIPUS TYRANNUS. The origin and development of the Greek drama. Outline study of the history of Greek literature.

13. (2) ARISTOPHANES, THE ACHARNIANS AND THE CLOUDS. Lectures on the origin and development of Greek drama. The Greek theater. *Two hours a week.*

German.

The methods employed in this department are intended to establish a broad and thorough foundation for an appreciative study of German literature. Courses 1-9 cover a period of three years, when the study of German is begun in the earlier years of the course in the Institute. Separate classes are formed for those who commence German after a preliminary course in Latin. In these classes the work of the three years' course is accomplished in two years.

Accurate and intelligent pronunciation is considered a valuable means for securing accuracy in inflection and fluency in speaking. The principles of phonetics are presented in simple form and repeated practice on exercises prepared especially for this purpose is required both in the class room and in the preparation of the lesson. Colloquial practice is introduced at the outset, taking at first the form of simple questions on the text, and increasing in difficulty until the entire recitation is conducted in German.

Translation from German into English is regarded as a means to an end, and is discarded when it is no longer needed as a test of the understanding of the text.

In composition direct translation from English into German is employed to some extent, but preference is given to reproductive exercises and independent themes. Exercises of this sort are required at least twice a week throughout the course.

The simpler principles of historical grammar are presented incidentally at an early stage in the course, and constant reference is made to the relation between English and German.

1, 2. (4) ELEMENTARY GERMAN. Drill on pronunciation; the inflection of nouns, adjectives, pronouns, and the simpler forms of verbs. Bierwirth's Grammar.

3. (2) ELEMENTARY GERMAN. Grammar continued. Verb forms are emphasized. Easy prose reading.

4. (2) READINGS IN EASY NARRATIVE PROSE. Continued drill on grammatical forms. Prose composition based on texts read.

5. (2) NARRATIVE PROSE AND ONE EASY COMEDY. Reproductive translation into German. Conversational exercises.

6. (2) SCHILLER'S WILHELM TELL. Reproductive translation and independent themes.

7. (2) HISTORICAL OR BIOGRAPHICAL PROSE. Selections from Freytag's "Bilder aus der deutschen Vergangenheit," or Von Sybel's "Erhebung Europas gegen Napoleon," Jagemann's or Poll's German Composition, twice a week.

8. (2) GOETHE'S GÖTZ VON BERLICHINGEN. Prose composition, reproductive work, and independent themes.

9. (2) A MODERN NOVEL. Sudermann's "Frau Sorge," or Ebner-Eschenbach's "Das Gemeindekind." Independent themes.

9a. (2) Scientific German. This course is co-ordinate with German 9 in the literary course. No student is admitted who has not at least six credits in German. Scientific readers and monographs.

10. (3) ADVANCED GERMAN. Lessing's Emilia Galotti and Hamburgische Dramaturgie. The life of Lessing is studied from English and German biographies, and his earlier dramas are read and reviewed by members of the class.

11. (3) SCHILLER'S WALLENSTEIN AND THIRTY YEARS' WAR. Reference work in history. The structure of the drama is made the subject of especial study.

12. (3) GOETHE'S DICHTUNG UND WAHRHEIT. Many of the earlier productions of the author are read in connection with this work, especially Die Leiden des jungen Werther. Themes on topics suggested by the readings.

French.

The language is studied for its disciplinary value and for the intrinsic worth of the literature, as well as for the advantage to the scientific student of availing himself of information to be found in French works relating to his special course. Power to speak and ability to read French are sought as a means to breadth of culture. A systematic knowledge of the structure and idioms is obtained through double translation. In all exercises attention is given to the correct use of English.

Courses 1-9 cover a period of three years, when the study of French is begun in the earlier years of the course in the Institute. Separate classes are formed for those who commence French after a preliminary course in Latin. In these classes the work of three years' course is accomplished in two years. Certain changes, however, are made in the texts read in order to meet the requirements of more mature students. The following substitutions will be made: In MODERN FRENCH COMEDIES, Le Gendre de Monsieur Poirier (Augier), La Question d'Argent (Dumas), Cyrano de Bergerac (Rostand); in MODERN FRENCH PROSE, Contes de Daudet (ed. Cameron); in THE ROMANTIC SCHOOL, Les Travailleurs de la Mer (Hugo); in HISTORICAL PROSE, La France Contemporaire (Taine).

1. (2) ELEMENTARY FRENCH. Rudiments of grammar; careful drill in pronunciation, repetition and memorizing of easy expressions, reading of anecdotes and short easy selections. Fraser and Squair's French Grammar.

2. (2) ELEMENTARY FRENCH. Grammar continued; drill on pronunciation; exercises, both English-French and French-English, de-

signed to fix in memory the forms and principles of grammar. Reader, Foster and Aldrich.

3. (2) ELEMENTARY FRENCH. Grammar; special attention given to irregular verbs and idioms; frequent conversational exercises; Grandgent's French composition based on La Dernière Classe (Daudet); Sans Famille (Malot). Le Petit Chose (Daudet).

4. (2) MODERN SHORT STORIES. Reading, Le Tour de la France (Bruno); Colomba (Mérimée); Le Pays de France (Foncin); Contes biographiques (Foa); Le Roi de Montagnes (About); François, French Composition; exercises, written and oral. Conversations based on text read; drill in verb forms and idioms.

5. (2) HISTORICAL PROSE. Reading, Jeanne d'Arc (Lamartine); Histoire d'un Payson (Erkmann et Chatrian); Le Siége de Paris (Sarcey); François' Composition continued; frequent abstracts, sometimes oral and sometimes written, of portions of texts already read.

6. (2) MODERN FRENCH COMEDIES. Reading, Moi (Labiche et Martin); Le Luthier de Crémone, Le Trésor (Coppée); Mlle. de la Seiglière (Sandeau); dictations; frequent résumés of texts read; continued drill on idioms, and constant application in the construction of sentences.

7. (2) Consideration of the Romantic School with special study of VICTOR HUGO. Reading, Quatrevingt-treize; Hernani and La Chute; prose composition, Grandgent's French Composition, Part V; letters, business and friendly. Constant practice in speaking French.

8. (2) MOLIÉRE. A careful study of his chief comedies and a survey of his art and ideas. Reading, L'Arave, Le Bourgeois Gentilhomme, Les Précieuses Ridicules; dictation; abstracts or reproductions from memory of selected portions of the matter read. Prose, Grandgent's Composition, Part IV; historical narration.

9. (2) THE CLASSIC DRAMA. Corneille, Racine. Reading, Le Cid, Polyeute (Corneille); Athalie, Andromaque (Racine). Dictation. Constant practice in giving French paraphrases of portions of texts read. Duval's Histoire de la Littérature Française is used throughout the year for the study of literature.

9a. (2) SCIENTIFIC FRENCH. This course is co-ordinate with French 9 in the literary course. Scientific readers and periodicals. Prose based on texts read.

10. (3) ADVANCED PROSE COMPOSITION AND CONVERSATION, based on practical subjects. Traveling; At the Custom House; At the Station; The Parisian; The Hotel; The Pension; General Description of Paris; The Chamber of Representatives, etc. Prerequisites, 1-9.

11. (3) GREAT WRITERS OF THE CLASSICAL PERIOD. Pascal, Bossuet, Mme. de Sévigné, Saint Simon, Boileau, Fénelon. Themes in French.

12. (3) CRITICAL PROSE OF THE NINETEENTH CENTURY Sainte-Beuve, Taine, Brunetière. Themes in French.

Spanish.

Spanish is offered as an elective for advanced students in French and for others who may desire a practical knowledge of the language for business purposes.

1. (2) ELEMENTARY SPANISH. De Torm's Grammar; all exercises written and reviewed orally. Appleton's Readers. Dictation and conversation.

2. (2) ELEMENTARY SPANISH. De Torm's Grammar. El Capitan Veneno (Alarcon). Essays, oral and written. Commercial letters.

3. (2) MARIANELA (GALDOS). Sight reading. Comparative Literature.

Domestic Economy.

The attention of students who are preparing to teach domestic economy is called to the Suggestive Curriculum on page 28. Such a curriculum is also a good preparation for the professional study of nursing and medicine.

1. (2) COOKERY. This course is designed for the younger pupils. It includes six hours a week of practical cooking, and four hours of elementary work in fuels, lighting, cleaning, the care of the house, and the composition of a few simple foods.

2. (2) COOKERY. A continuation of course 1.

3. (2) COOKERY. Most of the time of this course is devoted to practical cooking with the view of covering as much of the work of courses 1 and 2 as the time will permit.

A. (2) SEWING. Making of plain undergarments from patterns, with talks on materials and implements used. Use of machine with simple attachments.

B. (2) SEWING. Taking of measurements, making of undergarments continued, cutting from patterns.

C. (2) SEWING. Cutting and making of shirt waists, thin gowns, and dressing-sacks.

D, E, F. (6) SEWING. These courses are designed for those who are preparing to teach, and include, in addition to the work defined under A, B, and C, drafting and talks on textiles.

4. (1) HOUSEKEEPERS' COURSE IN COOKING. This course consists of practical work in the preparation of food, with the study of the food principles and the effect of heat upon each. It is designed to meet the needs of housekeepers rather than of young students. Two periods a week of two hours each.

5. (1) HOUSEKEEPERS' COURSE IN COOKING. A continuation of course 4. Instruction is given in the preparation of more elaborate dishes and in serving. Two periods a week of two hours each.

6. (2) HOUSEKEEPERS' COURSE IN COOKING. This course includes the work of courses 4 and 5. Four periods a week of two hours each.

7. (3) DOMESTIC ECONOMY. (a) The cooking of simple foods. The work is arranged to illustrate the different methods of cooking, and the effect of heat upon the five food principles. It includes also a study of the materials used. Laboratory work, four hours a week; lecture and recitation, one hour a week.

(b) Home Sanitation. A model house is planned, and its situation, ventilation, and plumbing discussed. Lecture and recitation, one hour a week.

(c) Hygiene. A study of the different systems of the body. Interdependence of the organs. Causes of pathological conditions. Relation of foods, narcotics, and stimulants to health. Lecture and laboratory work, two hours a week.

8. (3) DOMESTIC ECONOMY. (a) A continuance of 7 (a), with advanced work in cookery. The cost of food. Laboratory work, four hours a week; lecture and recitation, one hour a week.

(b) The chemistry and best methods of heating, lighting, and cleaning. The furnishing of the home. Lecture and recitation, one hour a week.

(c) Bacteriology. Preparation of media. Growth, staining, and examination of germs. Causes, pathology, symptoms, and general treatment of the more common diseases. Lecture and laboratory work, two hours a week.

9. (3) DOMESTIC ECONOMY. (a) Cooking in large quantities. Invalid cookery. Chafing dish course. Dietary work. Laboratory work, four hours a week; lecture and recitation, one hour a week.

(b) Chemistry of Foods. Tests for the five food principles, and for the detection of adulterations in food. Lecture and laboratory work, two hours a week.

(c) Home Nursing. Infection, quarantine, antisepetics, room, clothing, dietetics, hydrotherapy. Preventive medicine. Lecture and laboratory work two hours a week.

Courses 7, 8, and 9 are designed for those who are preparing to teach, and for others who wish instruction in advance of that given in preceding courses.

In addition to the work outlined above, fortnightly lectures on hygiene for all women in the Institute will be given by Dr. Janson.

Free-Hand Drawing.

In the work laid out for free-hand drawing, course 1 is intended to be of general educational value, and a foundation for other work in drawing.

In 2, 3, and 4 students will have an opportunity to carry on the work in drawing with greater liberty in the choice of mediums. It is planned to have this work prepare the student for advanced work in the study of art in art schools.

1. (2) FREE-HAND DRAWING. Drawing in charcoal from geometric solids, introducing fundamental principles of perspective, and light and shade. Charcoal from casts of features, hands, feet, heads, and historic ornament. One day in the week will be devoted to sketching in pencil and to a brief study of art history.

2. (2) FREE-HAND DRAWING. Charcoal from casts. Studies from still life in pen and ink, and wash. Elementary designing.

3. (2) FREE-HAND DRAWING. Water color, pen and ink, wash from still life. Advanced charcoal work.

4. (2) COLORING AND MODELING. Oil or water color, pen, wash, clay modeling, and charcoal.

Physical Culture.

The method of instruction pursued is not limited to any one system. Proper recognition is given to any method the whole or parts of which have been found useful, or which promise efficacy. Consideration is given to hereditary tendencies and to individuality, in physical possibilities, physical condition, and physical tastes. Individual training, therefore, is encouraged in every case, and especially where an examination discloses a student's inability to pursue general or concerted exercises, either from threatened injury or inability to profit by such work.

Students upon entering the Institute are entitled without cost to a thorough physical examination. The examination includes accurate measurements of the physical proportions, a careful examination of the heart, lungs, and spine, and the strength of the principal groups of muscles; at the same time, information is solicited concerning heredity.

In every case where a defect is found in the boy's heart or lungs, he is advised to consult a physician, as the presence only, and not the degree of the defect, is determined. Upon the basis of the information so gathered, instruction is given as to particular exercises and the use of various developing apparatus.

In addition to individual work, daily classes are given (commencing immediately after Thanksgiving Recess and continuing to the Easter Recess) in hygienic, educative, corrective, competitive, and recreative gymnastics, adapted as nearly as possible to the needs of individuals of all ages and physical conditions. The exercises so given are carefully graded as to progression, physiological effects, mechanical difficulty, and the boy's power of correct muscular co-ordination.

The boys' gymnasium contains a spacious exercise hall (90x40 feet),

equipped with the most approved developing appliances, as well as apparatus for light and heavy gymnastics, hand-ball and basket-ball courts, shower and sponge baths, locker rooms and lockers, lavatories, visitors' gallery, and instructor's office.

The gymnasium is open from 9 a. m. to 7 p. m., every school day. Attendance is voluntary and free of cost to all. Classes are arranged at such hours as not to conflict with other school duties.

A separate gymnasium is provided for girls, and the courses of instruction outlined above are modified to meet the particular needs of girls.

ATHLETICS.

During the Autumn and Spring Quarters out-of-door athletic games and sports are practiced under the personal supervision of the Instructor in Physical Culture. Only such games and sports are encouraged as the location, character, and athletic equipment of the school make it desirable and possible to pursue.

Students are not permitted to compete on athletic teams without first passing a satisfactory physical examination.

The School of Engineering.

Students are admitted to the School of Engineering on the same conditions as to the School of Arts. Graduates of Chicago high schools and other schools of equal rank are given credit for so much of the work outlined in the curricula as they have mastered, which should be sufficient to enable them to complete the courses of instruction leading to the degree of Mechanical Engineer in four years.

The School of Engineering limits its work to what may be called the mechanical engineering subjects proper, namely, drawing and designing, shop practice, applied mathematics, steam and electricity, with such electives in the last two years as enable the student to specialize in shop, steam, electrical, or chemical engineering. Instruction in mathematics, physics, chemistry, history, English, and modern languages is given in the School of Arts.

Two curricula are outlined on pages 54 and 55, an Eight-Year Curriculum and a Seven-Year Curriculum, the latter indicating the minimum requirements for the degree. The basis of successful engineering study must be broad and solid, and candidates for the degree are encouraged to secure as complete a general education as time and means permit.

It is the purpose of the Institute to do as much as possible for every individual student, considering the time and money at his command. The greatest service it can render the man of small means is to save his time without sacrificing educational essentials. By careful correlation of work and by methods of individual instruction the Institute has been fortunate in accomplishing this end. Students of good ability entering at the age of fourteen have been graduated at twenty-one. This is a saving of at least two years over customary curricula. It is accomplished by having the student in one atmosphere for the seven most important years of his intellectual life.

EIGHT-YEAR CURRICULUM FOR DEGREE OF M. E.

Year.	Autumn Quarter.	Course No.	No. of Credits.	Hours in Class.	Winter Quarter.	Course No.	No. of Credits.	Hours in Class.	Spring Quarter.	Course No.	No. of Credits.	Hours in Class.
First.	English	1	2	1	English	2	2	1	English	3	2	1
	Mathematics	1	2	2	Mathematics	2	2	1	Mathematics	3	2	2
	Latin	1	2	1	Latin	2	2	2	Latin	3	2	1
	Sketching	1	2	2	Woodwork	2	2	2	Drawing	5	2	2
	Total	....	8	6		....	8	6		....	8	6
Second.	English	4	2	1	English	5	2	1	English	6	2	1
	Mathematics	4	2	1	Mathematics	5	2	1	Mathematics	6	2	1
	Latin	4	2	1	Latin	5	2	1	Latin	6	2	1
	Forge	3	2	2	Foundry	4	2	2	Drawing	6	2	2
	Total	....	8	5		....	8	5		....	8	5
Third.	Mathematics	12	3	1	History	5	3	1	History	6	3	1
	Physics	1	3	3	Physics	2	3	3	Physics	3	3	3
	German	1½	3	1	German	3	3	1	German	4½	3	1
	Total	....	9	5		....	9	5		....	9	5
Fourth.	English	7	3	1	English	8	3	1	Mathematics	10	3	1
	Chemistry	1	3	3	Chemistry	2	3	3	Chemistry	3	3	3
	German	7	3	1	German	8	3	1	German	9	3	1
	Total	....	9	5		....	9	5		....	9	5
Fifth.	Mathematics	13	3	1	Mathematics	14	3	1	Mathematics	15	3	1
	French or Spanish	1	2	1	French or Spanish	2	2	1	French or Spanish	3	2	1
	Drawing	10	2	2	Drawing	12	2	2	Drawing	11	2	2
	Machine Shop	19	2	2	Pattern Shop	7	2	2	Pattern Shop	8	2	2
	Total	....	9	6		....	9	6		....	9	6
Sixth.	Physics	4	3	3	Physics	5	3	3	Physics	6	3	3
	Mathematics	16	3	1	Mathematics	17	3	1	Mathematics	18	3	1
	Descriptive Geom.	25	2	2	Kinematics	28	2	2	Eng'g Laboratory	15	2	2
	Machine Shop	20	2	2	Machine Shop	22	2	2	Machine Shop	23	2	2
	Total	....	10	8		....	10	8		....	10	8
Seventh.*	Statics	16	3	1	Dynamics	17	3	1	Strength of Materials.	18	3	1
	Thermodynamics	43	3	1	Eng'g Laboratory	48	2	2	Testing Machines	46	2	2
	Chemistry	4	3	3	Chemistry	5	3	3	Chemistry	6	3	3
		....	....	...	Forge	21	2	2	Foundry	9	2	2
	Total	....	9	5		...	10	8		....	10	8
Eighth.*	Thesis	51	1	0	Thesis	51	3	2	Thesis	51	5	3
	Machine Design	27	2	2	Hydraulic Mach'n'y	47	2	2	Specifications and Contracts	50	1	1
	Hydraulics	42	2	1	Structural Design	33	3	2				
	Chemistry	9	4	4	Chemistry	10	2	2	Chemistry	11	3	3
	Total	....	9	7		....	10	8		....	9	7

* For the last two years, the Sixth and Seventh years of the Seven-Year Curriculum may be substituted.

SEVEN-YEAR CURRICULUM FOR DEGREE OF M. E.

TUMN RTER	Course No.	No. of Credits.	Hours in Class.	WINTER QUARTER	Course No.	No. of Credits.	Hours in Class.	SPRING QUARTER.	Course No.	No. of Credits.	Hours in Class.
.....	1	2	1	English	2	2	1	English.....	3	2	1
atics	1	2	2	Mathematics.....	2	2	2	Mathematics	3	2	2
.....	1	2	1	German	2	2	1	German	3	2	1
rk	2	2	2	Sketching	1	2	2	Drawing	5	2	2
.....	..	8	6	.....	..	8	6	.....	..	8	6
.....	4	2	1	English.....	5	2	1	English.....	6	2	1
atics	4	2	1	Mathematics.....	5	2	1	Mathematics	6	2	1
.....	4	2	1	German.....	5	2	1	German	6	2	1
.....	6	2	2	Foundry	4	2	2	Forge	3	2	2
.....	..	8	5	.....	..	8	5	.....	..	8	5
.....	7	3	1	English.....	8	3	1	History	6	3	1
atics	12	3	1	History	5	3	1	Mathematics	10	3	1
.....	1	3	3	Physics	2	3	3	Physics	3	3	3
Shop.....	19	2	2	Drawing.....	10	2	2	Pattern Shop.....	7	2	2
.....	..	11	7	.....	..	11	7	.....	..	11	7
atics	13	3	1	Mathematics.....	14	3	1	Mathematics.....	15	3	1
ry.....	1	3	3	Chemistry	2	3	3	Chemistry	3	3	3
, or.....	7	2	1	German or	8	2	1	German or.....	9	2	1
r Spanish.	1	..	..	French or Spanish....	2	..	..	French or Spanish....	3	..	..
Shop.....	8	2	2	Drawing.....	12	2	2	Drawing..	11	2	2
.....	..	10	7	.....	..	10	7	.....	.	10	7
atics	16	3	1	Mathematics.....	17	3	1	Mathematics.....	18	3	1
.....	4	3	3	Physics	5	3	3	Physics.....	6	3	3
tive Geom.	25	2	2	Kinematics.....	28	2	2	Eng'g Laboratory....	15	2	2
Shop.....	20	2	2	Machine Shop.....	22	2	2	Machine Shop	23	2	2
.....	..	10	8	.....	..	10	8	.....	..	10	8
.....	16	3	1	Dynamics	17	3	1	Strength of Materials.	18	3	1
dynamics..	43	3	1	Eng'g Laboratory....	48	2	2	Testing Machines	46	2	2
ears.....	31	2	2	Direct Current M'ch'y	37	2	2	Altern.Current M'ch'y	38	2	2
.....	21	2	2	Steam Engine Design	32	2	2	Foundry	9	2	2
.....	..	10	6	.....	..	9	7	.....	..	9	7
.....	51	1	0	Thesis	51	3	2	Thesis	51	5	3
Design ..	27	2	2	Hydraulic M'ch'y.....	47	2	2	Specifications and	50	1	1
ics	42	2	1	Structural Design.....	33	3	2	Contracts			
l Lab'y..	35	3	3	Engine Tests...	45	2	2	Power Plant Tests	49	3	3
.....	..	8	6	.....	..	10	8	.....	..	9	7

last two years, the Seventh and Eighth Years of the Eight-Year Curriculum may be substituted who wish to specialize in Chemical Engineering.

Courses of Instruction in the School of Engineering.

Engineering.

The work classified under this head embraces applied mathematics, applied electricity, testing of machinery and instruments, drawing and designing, shop practice, and machine construction.

The aim is to present these subjects in such order and comprehensiveness as to meet the requirements of those who complete the courses and those who do not, enabling some to throw their entire energy into professional studies and others to receive the fundamental instruction necessary for practical work on leaving the Institute.

While the work outlined has direct bearing on the training of the mechanical engineer, the student who expects to follow any branch of engineering or architecture will find much that will be of service in his subsequent work.

The location of the Institute allows advantage to be taken of extensive and varied manufacturing establishments, and throughout the four years there will be required of each student in the Engineering Courses monthly visits of inspection, under the direction of an instructor, to some shop where notes and sketches will be made. These trips will usually be made on Saturdays. A familiarity with constructive work on a scale and variety impossible in one shop will thus be obtained.

In the shops and in the drawing rooms of the Institute, methods and principles will be presented, when possible, by exercises of ultimate value as parts of machines or apparatus.

In shop and drawing room and laboratory work, time carde are made out daily by each student, stating the character of work done, materials, number of machine, and drawings used. These are kept on file and transferred at the end of each six weeks to sheets, showing at a glance the variety of work performed, hours on different machines, etc.

1. (2) Free-Hand Sketching. This course is designed to enable the student to work constructively in perspective, and to make neat dimension sketches of machine parts.

2. (2) Wood Work. Uses and care of tools. Exercises in sawing,

planing and laying out work. Application of the ordinary carpenter's and joiner's tools, such as saws, bench, rabbeting and moulding-planes, chisels, gouges, brace and bits, hammer, square, bevel, etc., in the construction of the principal joints used in carpentry and joinery. Center, face plate, screw and hollow chuck, and templet turning. Distinguishing characteristics of the various kinds of wood in ordinary use and the methods of finishing.

2a. (2) WOOD WORK (*Advanced course*). This course affords those who have gained some facility in the handling of carpenters' tools further practice in their use, and also an opportunity to do more advanced work. Applications of the principles given in course 2 to methods of laying out and constructing frames, of buildings, roofs, roof trusses, bridges, etc., doors, door frames, window sash and frames, stairs and stair railing, and various forms of apparatus for chemical, physical, and engineering laboratories.

3. (2) FORGE WORK. Management of fire. Practice in drawing out, upsetting, bending, forming, fullering, swaging, punching, and welding of iron and mild steel. Tool-steel working, hardening and tempering. Illustrations of the effect of differences in the composition of iron and steel upon their mechanical properties, and the method of treating the different cases.

4. (2) FOUNDRY WORK. Preparing and mixing sand and facings, bench and floor mouldings of ordinary patterns; match plate work, making sand and plaster follow boards; making, baking, and setting cores; crucible melting; management of furnace, preparing charges of iron and brass; cleaning, lining, and charging cupola; melting, skimming, pouring, cleaning, and tumbling castings.

5. (2) INSTRUMENTAL DRAWING. This is the first work with drawing instruments and has for its aim the proper handling of instruments and some facility in line work. Especial attention is paid to accuracy of construction.

6. (2) PROJECTION DRAWING. The knowledge and use of planes of projection are taught in this course. In view of the use to which it may be later applied, the third angle will be used for most projections.

7. (2) PATTERN-MAKING. Practice in the use of general wood-working machines, such as the surface planer, joiner, circular and band saws, lathe, trimmers, shoot-board, and the ordinary hand tools; in the preparation, cutting, fitting and gluing of stock used in the making of patterns, and the necessary core-boxes of angle and surface plates, collars, flanges, pipe fittings, valves, pulley rings, hand wheels, etc.

8. (2) PATTERN-MAKING (*Advanced course*). Application of the methods of the preceding course to the making of patterns for general machine work, including hangers, journal boxes, pulleys, sheaves, spur, bevel, and worm gears, machine details, engine frames, cylinders, valves,

etc., match plates, follow boards, sweeps for loam work, skeleton core-boxes, and patterns.

9. (2) FOUNDRY WORK (*Advanced course*). Floor moulding, including patterns of complicated form requiring the use of drawbacks, anchor plates, cheeks, etc.; dry sand, loam, and pit moulding, sweep work, and green sand core making. Mechanical properties of the different grades of pig iron and their mixtures.

10. (2) MECHANICAL DRAWING. Lettering and conventional representation of frequently recurring parts of machines, such as nuts, threads, fastenings, etc. This course is designed to establish standard methods of lettering, dimensioning, and conventional representations.

10a. (2) MECHANICAL DRAWING. Continuation of course 10.

11. (2) MACHINE DESIGN SKETCHING. This course has for its object facility in putting on paper sketched designs which can afterwards be put into shop drawings.

12. (2) WORKING DRAWINGS FROM SKETCHES. The making of finished working drawings from sketches made in the preceding course. This course is designed to teach certain well established modes in use by designers of machinery. All drawings are made in pencil, and some are afterward traced on cloth.

15. (2) ENGINEERING LABORATORY. Such work with engines, boilers, generators, motors, dynamometers, and testing machines as is needed to give the student that familiarity with them requisite to the intelligent study of electrodynamics, thermodynamics, mechanics, and machine design.

16. (3) STATICS. Composition and equilibrium of concurrent forces; parallel forces and center of gravity; couples and composition and equilibrium of non-concurrent forces; suspended weights and catenary.

17. (3) DYNAMICS. Uniform motion, falling bodies, Newton's laws, and mass; accelerated motion; impact; virtual velocities, moment of inertia; work, energy, power; friction.

18. (3) STRENGTH OF MATERIALS. Elementary stresses and strains, tension, compression, shearing, and torsion; flexure of beams; continuous girders; flexure of long columns.

19. (2) BENCH METAL WORK. Clipping, filing, and polishing of cast and wrought iron and steel; laying out work, drilling, tapping, reaming, scraping flat surfaces to surface plate. Illustration and designation of the different shapes and cuts of files and the uses to which they are adapted.

20. (2) MACHINE TOOL WORK. Explanation of the construction of the different forms of machine tools; directions for operating and keeping tools in order. Practice in centering, plain, taper, and templet turning, chucking, drilling, boring, external and internal thread cutting; hand tool turning, filing, polishing; planing, shaping, plain milling; forms of cutting tools and instructions in grinding.

21. (2) FORGE WORK (*Advanced Course*). Tool dressing, hardening, and tempering in open fire, lead, sand bath, and oil; case-hardening; annealing; steam hammer work, faggot-welding, engine and machine forgings.

22. (2) TOOL AND SCREW MAKING. Use of the lathe, drill press, planer, shaper, universal miller, universal grinders, hand tools, standard gauges, micrometer, and vernier calipers, in construction of accurate reamers, taps, dies, and straight, spiral, angular, side, end, and formed milling cutters, etc. Setting up and operating screw machine; making machine screws, nuts, studs, and formed work.

23. (2) MACHINE TOOL WORK (*Advanced course*). Continued practice in the use of machine tools in the boring, turning, sizing, and cutting of spur, bevel, and spiral gears; worms and worm wheels. Planing, milling, scraping, fitting, and finishing the sliding surfaces and parts of machines.

24. (2) MACHINE ERECTING. Practice in assembling, erecting, finishing, fitting, and adjusting complete machines.

25. (2) DESCRIPTIVE GEOMETRY. Graphical methods of solving problems of intersections of lines, planes, surfaces, and solids, and developed shapes. Practical problems designed to secure facility in the application of principles.

26. (2) DESCRIPTIVE GEOMETRY AND MECHANICAL PERSPECTIVE. This course is a continuation of the preceding and extends into mechanical perspective. The laws of perspective are studied and their application made in producing simple perspective drawings from projections.

27. (2) MACHINE DRAWING. With the aid of handbooks of data and formulas, the use of which is encouraged in previous courses, this course will call for designs reproduced from cuts and photographs.

28. (2) ELEMENTS OF MECHANISMS. The study of elementary combinations, pulleys, and belts, gearing, etc.

29. (2) PRACTICAL KINEMATIC PROBLEMS. A study of the laws of motion, linkages, trains of gearing, and problems in the determination of combinations necessary to secure required motions.

30. (2) SPECIAL MACHINERY DESIGN. The design of some machine which will exhibit the observational, inventive, and analytical ability of the student is undertaken in this course. Students must have completed the courses in engineering and physics outlined in the curricula leading to the degree of M. E. before taking this course.

31. (2) VALVE GEAR DESIGN. The familiarity of the student with kinematics, and his previous practice in drawing are made use of in this course in the investigation of various valve gear motions, and applied to problems in actual designing.

32. (2) STEAM ENGINE DESIGN. A study of the fundamental problems of steam engine design, such as the influence of the weight of

reciprocating parts on steady running, etc. A theoretical design will be undertaken and compared with the practice of leading builders.

33. (3) STRUCTURAL STEEL WORK. The study of trusses, plate girders, and detail used in building frames, bridges, roofs, and cranes. The subject of specifications according to current practice will be carefully considered.

34. (2) THEORY OF ELECTRODYNAMIC MACHINERY. A course of lectures dealing with the elements of dynamo machinery and laboratory practice in its use for lighting and power.

35. (3) CONSTRUCTION AND TESTING OF DIRECT CURRENT MACHINERY. Lectures and laboratory practice in direct current dynamo testing, including the theory and use of instruments.

36. (2) CONSTRUCTION AND TESTING OF ALTERNATING CURRENT MACHINERY. Lecture and laboratory practice in alternate current machinery testing.

37. (2) DESIGN OF ELECTROMAGNETS AND DIRECT CURRENT MACHINERY. A course in mechanical, magnetic, and electrical calculations for special machinery with practice in construction and tests of design in laboratory.

38. (2) DESIGN OF ALTERNATING CURRENT MACHINERY AND APPLIANCES. Complete calculations for alternators and transformers with practice in construction and tests of original and commercial machinery.

39. (2) ELECTRIC TRANSMISSION. Theory of electric transmission; insulation and insulators; measurements of insulation resistance; location of faults.

40. (2) PROBLEMS IN ELECTRIC TRANSMISSION. Direct current, single phase, and polyphase; methods of distribution as applied to electric lighting and transmission of power; effects of the different methods on first cost and operating expenses.

41. (2) THE TELEGRAPH, TELEPHONE, AND ELECTRIC SIGNALING. Theory and practice.

42. (2) HYDRAULICS. The law governing fluids in motion, flow of water through orifices and pipe, losses of head by friction; hydraulic motors and their efficiencies.

43. (3) THERMODYNAMICS. Mechanical theory of heat; laws of thermodynamics as applied to heat engines and refrigerating machines; analysis of the action of injectors and other steam apparatus.

44. (2) STEAM BOILERS. The various forms and peculiarities of modern boilers, the proportion of heating surface, grate areas, and chimney capacity, as related to the best performance under various conditions; the various apparatus related to boilers.

45. (2) LABORATORY ENGINE TESTS. Calorimeter tests for determining the quality of steam; boiler efficiency tests; similar tests of steam and power pumps under various conditions, such as are likely to occur in practice.

46. (2) TESTING MACHINERY PRACTICE. Tests of materials of construction; determining the elastic limit and ultimate strength under tension, compression, and torsion.

47. (2) HYDRAULIC MACHINERY TESTS. Hydraulic experiments in the flow of water through pipes and orifices; pumps of various kinds tested for the duty performed under known conditions of power furnished by steam or mechanically transmitted power.

48. (2) POWER MEASUREMENT TESTS. Measurement of power by rope, hydraulic, and Prony brakes; use of Morin, Weber, cradle, floating, and other forms of transmitting dynamometers.

49. (3) POWER PLANT TESTS. Complete tests of power plants from the weighing of the coal to the worked up reports of condition, arrangement, and general efficiency of boilers, engines, generators, and motors.

50. (1) SPECIFICATIONS AND CONTRACTS. Commercial specifications and contracts, such as the engineer is likely to require a general knowledge of, are treated in a regular course of lectures supplemented with occasional addresses by men who have given extensive study to special phases of the subject.

51. (9) THESIS. Each candidate for degree of mechanical engineer is required to present a thesis on some engineering subject which he has investigated during his senior year. In this work he is thrown largely on his own responsibility, and must present a thesis showing capacity for careful observation, invention, and deduction. The subject should be chosen before the close of the junior year and submitted to the head of the department for approval. In the autumn quarter one hour a day is devoted to the literature on the subject, in the winter three hours a day to preparing apparatus and preliminary experiments, and in the spring five hours a day to completing the investigation and writing results. Frequent consultations with the instructor in whose field the subject is chosen and a written weekly report of progress are required. The thesis shall be typewritten, of standard dimensions and binding, and deposited in the library before graduation.

SCHEDULE OF CLASSES.	Room.	Autumn Quarter.									Winter Quarter.									Spring Quarter.								
Year 1903-4.		Hours and Courses.									Hours and Courses.									Hours and Courses.								
Instructors.		8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4
English.																												
Lewis	5	..	11	9	9	..	..	..	..	..	..	13	10	10	..	..	..	..	..	..	12	..	11	..	..	..	..	..
Kohlsaat	32	..	7	..	..	..	4	..	1	..	..	8	..	..	..	5	..	2	..	..	8	..	..	..	6	..	3	..
Gustafson	27	..	..	..	..	..	4	7	1	..	..	..	..	..	..	6	8	2	..	..	..	..	..	..	..	..	..	..
Owen	29	..	..	..	7	..	4	..	1	..	..	..	..	8	..	5	..	2	..	..	..	..	8	..	6	..	3	..
Miller	21	..	1-6	..	..	..	4	..	1	..	..	7	..	..	..	5	..	2	..	..	8	..	..	..	6	..	3	..
Andrus	25	..	..	..	..	..	4	1	1	..	..	..	..	7	..	5	2	2	.	..	..	..	..	..	6	3	3	..
Beezley	22	..	..	..	..	..	4	..	1	..	..	..	..	..	..	5	..	2	..	..	..	..	..	..	6	..	3	..
Clark	27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..	3	..
Nourse	27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..
Stickel	27	..	..	..	..	..	..	..	..	..	..	..	..	..	.	..	..	..	.	..	..	..	..	..	6	..	..	..
History.																												
Mann	36	..	3	..	..	..	3	..	..	.	..	4	..	..	..	..	..	..	..	7	3	..	..	..	..	..	..	..
Fertig	35	..	1	1	7	..	..	..	..	..	..	2	2	8	..	..	..	..	..	..	..	1	9	..	..	..	..	..
Mathematics.																												
Greeson	26	..	1	..	10	..	13	4	..	..	13	2	..	..	..	14	5	..	..	13	3	..	15	.	..	6	..	..
Mann	37	..	..	3	11	..	..	..	..	..	..	..	4	10	..	..	.	..	..	..	..	5	10	..	..	..	..	..
Moseley	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	18	..	..	..	..	..	..	..	..
Cobb	38	13	2	4	..	..	1—1	..	..	..	14	3	5	..	..	2—2		..	..	15	..	6	..	..	3—3		6a	..
Fertig	35	..	..	..	..	..	..	..	..	..	..	.	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	.
Studley	4	..	16	..	12	..	10	12	..	..	..	17	..	12	.	10	12	..	..	..	14	..	12	..	12	10	..	..
Pope	24	..	4	1—1		..	5	7	..	..	..	5	2—2		..	6	8	..	..	4	6	3—3		..	..	9	..	..
Lay	28	4	6	1—1		..	1—1		..	..	6	1	2—2		..	2—2		..	..	2	2	3—3		..	3—3		..	..
Wheeler	27	..	1	13	4	..	..	..	..	..	..	2	13	5	..	..	..	..	..	..	..	14	6	..	..	..	..	..
Engineering.																												
Chamberlain	7	..	..	25	43	..	27—31		..	..	10—10		48—48		..	28	..	..	..	49—49		50—51		..	15—15		..	..
DePuy	59	19—23		19—23		..	19—23		..	..	20—23		20—23		..	20—23		20—23		20—23		20—23		..	20—23		20—23	
Moseley	6	..	16	10—12		..	..	..	..	..	..	17	..	..	..	47—47		33—33		..	18	12—12		..	46—46		..	..
Ross	79	2—2		2—2		..	2—2		7—8		2—2		7—8		..	2—2		7—8		2—2		7—8		..	2—2		7—8	
Hoyt	99	4—4		4—4		..	..	..	4—4		4—4		4—4		..	..	4—4		..	4—4		4—4		..	..	..	9—9	
Bacon	D	3—3		3—3		..	..	..	21—21		3—3		3—3		..	..	..	3—3		3—3		3—3		..	3—3		..	..
Schenck	95	1—1		1—1		..	1—1		..	..	11—11		1—1		..	1—1		..	..	11—11		10—10		..	1—1		..	..
Hawley	96	5—6		5—6		..	..	6—6		..	6—6		5—6		..	..	5—6		..	6—10		6—6		..	..	6—6		..
Niles		..	..	35—35		..	..	..	..	..	..		..	..	..	..	..	37—37		..	..	38—38		..	..	..	..	..
Taft	57	19—23		19—23		..	19—23		..	..	20—23		20—23		..	19—19		19—19		20—23		20—23		..	19—19		19—19	
Wheeler	97	..	..	..	..	..	5—5		..	..	.	..	..	..	..	5—5		..	..	5—5		..	..	..	5—5		..	..
Kinney	9	..	..	..	.	..	..	..	..	..	..	..	2—2		..	..	..	..	..	..	..	2—2		..	..	..	..	..
Henning	97	..	..	..	..	..	..	..	..	..	5—5		..	..	..	:	..	..	..	..	..	..	..	..	..	..	..	..

SCHEDULE OF CLASSES.	Room.	AUTUMN QUARTER.									WINTER QUARTER.									SPRING QUARTER.								
YEAR 1903-4.		Hours and Courses.									Hours and Courses.									Hours and Courses.								
Instructors.		8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4
PHYSIOGRAPHY.																												
Peet	30	2—2		2—2		..	2—2		..	..	1—1		1—1		..	1—1		..	..	2—2		4	..	..	2—2		..	..
PHYSICS.																												
Woodworth	55	..	..	1	1—1		..	..	..	..	..	..	2	2—2		..	..	..	..	..	..	3	3—3		..	..	..	..
Rogers	54	..	..	..	..	4—4	4		1—1		..	..	..	..	5—5		5	2—2		..	..	..	..	6—6		6	3—3	
Nies	48	1—1		..	..	..	1—1		..	..	2—2		..	..	..	2—2		..	..	3—3		..	..	..	3—3		..	..
CHEMISTRY.																												
Smith	72	..	..	1	1—1		4	..	..	..	..	..	2	2—2	5,7		..	..	..	..	..	3	3—3	6,8		..	..	..
Trowbridge	66	..	..	..	A	..	..	4—4		..	7—7		..	B	..	..	5—11		..	..	..	..	C	..	..	6—12		..
Hora	68	1—1		A	..	..	1—1		1—1		2—2		B	..	..	2—2		2—2		3—3		C	..	..	3—3		3—3	
BIOLOGY.																												
Janson	72	..	..	..	..	..	..	..	1—1		..	..	..	..	..	..	..	2—2		..	..	..	..	..	..	..	3—3	
PHILOSOPHY.																												
Tufts	40	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
LATIN.																												
Nelson	47	..	10	1—1		..	10	4	..	..	..	15	2—2		..	11	5	..	..	17	..	3—3		..	12	6	..	..
Tenney	44	..	4	1	5	..	..	7	..	..	..	5	2	8	..	..	..	..	..	14	6	..	9	..	..	..	..	..
Street	40	..	1	..	4	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	3	3	..	..	..	..	..	..
Smalley	46	..	13	7	13	..	1—1		..	..	..	8	1—1		..	2—2		..	..	..	9	3—3		..	3—3		..	..
GREEK.																												
Street	40	..	..	..	..	..	1	4	..	..	..	..	8	..	..	2—5		..	..	..	..	..	..	..	3	6	..	..
GERMAN.																												
Jones	41	..	7	10	1	..	7	..	..	..	..	8	11	3	..	8	..	..	..	..	9a	12	5	..	9	..	..	..
Peet	42	..	1	1	4	..	..	1	..	..	..	2	2	5	..	..	2	..	..	..	3	3	6	..	..	3	..	..
Forster	45	.	4	..	.	..	..	1	..	..	..	5	..	..	..	..	3	..	..	..	6	..	..	..	..	5	..	..
FRENCH.																												
DeLagneau	20	..	7	10	1	..	7	..	..	..	..	8	11	3	..	8	..	..	..	..	9	12	5	..	9	..	..	..
Forster	45	..	..	1	4	..	..	..	..	..	..	..	2	5	..	..	..	..	..	..	..	3	6	..	..	..	..	..
SPANISH.																												
Staud	22	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..
DOM. ECONOMY.																												
Smith	67	7—7		4—4		..	..	..	..	..	8—8		5—5		..	..	..	..	..	9—9		6—6		..	..	..	..	..
Watson	87	..	..	..	..	..	A	—	C	..	..	..	..	..	..	A	—	C	..	..	..	..	..	..	A	—	C	..
Lester	67	..	..	..	..	..	1—1		..	..	..	..	..	..	..	2—2		..	..	..	..	..	..	..	1—1		..	..
Ingersoll	85	..	..	A—A		..	A—A		..	..	..	..	A—B		..	A—B		..	..	..	..	A—C		..	A—C		..	..
DRAWING.																												
Bassett	86	..	1	—	3	..	1	—	3	..	..	1	—	3	..	1—3		..	..	..	1	—	3	..	1—3		..	..

Schedule of Courses of Instruction for Year 1904-5.

Day Courses.	Autumn Quarter.									Winter Quarter.									Spring Quarter.								
Subjects of Instruction.	Hours and Courses.									Hours and Courses.									Hours and Courses.								
	8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4
English	..	11	9	9	..	..	..	15	..	..	13	10	10	..	..	..	15	..	..	11	..	12	..	..	..	15	..
English	..	7	1-6	7	..	..	7	..	..	..	8	7	8	..	..	8	..	..	..	1-8	8	8	..	..	1-8	..	..
English	..	1	..	..	..	4	..	1	..	..	2	..	7	..	5	..	2	..	..	3	..	..	..	6	..	3	..
History	..	..	3	7	..	4	..	..	..	..	..	5	8	..	..	..	..	..	6	3	..	9	..	..	..	..	..
History	..	1	1		..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
Mathematics	13	16	..	12	..	13	12	..	..	14	17	13	12	..	14	12	..	..	18	..	14	12	..	15	10	..	..
Mathematics	5	2	6	10	..	10	7	..	..	6	3	4	..	..	10	8	..	..	15	6	..	10	..	12	19	..	..
Mathematics	4	4	4	4	..	..	4	..	..	5	5	5	5	..	..	5	..	..	13	4	5	6	..	..	6	..	..
Mathematics	..	1	1—1	..	..	1—1	..	..	..	..	2	2—2	..	..	2—2	..	..	..	2	2	3—3	..	..	3—3	..	..	..
Engineering	42	..	25	43	..	27—27	..	..	..	..	17	48—48	..	..	47—48		33—33		49—49		50—51	..	..	46—46	..	..	..
Engineering	..	16	35—35		..	31—31	..	21		11—11		37—37	..	..	28	..	..	..	..	18	38—38	..	..	15—15	..	..	..
Engineering	20—22		20—22		..	19—22		19—22		20—22		20—22	..	..	19—22		19—22		20—22		20—22	..	..	19—22		19—22	
Engineering	..	..	10—12		..	..	..	7—8		10—10		7—8	..	..	..	..	7—8		11—11		10—10	..	..	..	6—6	..	..
Engineering	5—6		5—6		..	..	6—6		..	5—6		5—6	..	..	..	5—6	..		5—6		6—6	..	..	5—5	..	..	..
Engineering	4—4		4—4		..	..	..	4—4		4—4		4—4	..	..	..	4—4	..		4—4		4—4	..	..	..	..	9—9	
Engineering	3—3		3—3		..	..	3—3		..	3—3		3—3	..	..	..	..	3—3		3—3		3—3	..	..	3—3	..	..	..
Engineering	2—2		2—2		..	2—2	..	..	..	2—2		2—2	..	..	2—2	..	..		2—2		2—2	..	..	2—2	..	..	..
Engineering	1—1		1—1		..	1—1	..	..	..	..	..	1—1	..	..	1—1	..	..		..	..	..	..	..	1—1	..	..	..
Physiography	2—2		2—2		..	2—2	..	..	..	1—1		1—1	..	..	1—1	..	..		2—2		4	..	..	2—2	..	..	..
Physics	..	1	..	..	..	..	4	..	..	..	2	..	..	..	..	5	..	..	..	3	..	..	..	..	6	..	..
Laboratory	1	..	1	1	4—4		1	..	..	2	..	2	2	5—5		2	..	..	3	..	3	3	6—6		3	..	..
Chemistry	..	..	1	A	..	4	..	..	..	..	..	2	B	..	5,7	..	..	..	..	..	3	C	..	6,8	..	..	..
Laboratory	1—1		A	1—1		1—1		1—1		2—2		B	2—2		2—2		2—2		3—3		C	3—3		3—3		3—3	
Laboratory	9—19		..	..	..	..	4—4		..	9—19		B	..	..	..	5—7	..		9—19		..	..	..	..	6—8	..	
Biology	..	..	..	..	..	..	..	1—1		..	..	..	..	..	..	..	2—2		..	..	..	..	..	..	..	3—3	
Philosophy	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	3	..	..
Latin	.	..	13	13	..	..	..	..	..	..	15	..	8	..	11	..	..	..	14	..	..	9	..	12	..	..	..
Latin	10	7	..	7	..	10	..	..	..	..	8	..	..	..	..	..	..	..	6	9	..	..	..	..	..	..	..
Latin	4	4	..	..	..	..	4	..	..	5	5	2—2	..	..	..	5	..	..	..	6	3—3	..	..	..	6	..	..
Latin	1	1	1—1		..	1—1	..	..	..	2	2	1—1	..	..	2—2	..	..	..	3	3	3—3	..	..	3—3	..	..	..
Greek	..	..	9	..	..	1	4	..	..	..	..	8	..	..	2	5	..	..	..	..	10	..	..	3	6	..	..
German	..	7	10	..	..	7	..	..	..	..	8	11	..	..	8	..	..	..	..	9a	12	..	..	9	..	..	..
German	..	4	..	4	..	..	1	..	..	..	5	..	5	..	..	3	..	..	..	6	..	6	..	..	5	..	..
German	..	1	1	1-2	..	..	1-2	..	..	..	2	2	3	..	..	2	..	..	..	3	3	5	..	..	3	..	..
French	..	7	10	4	..	7	..	..	..	..	8	11	5	..	8	..	..	..	..	9	12	6	..	9	..	..	..
French	..	..	1	1-2	..	..	..	..	..	..	..	2	3	..	..	..	..	..	..	..	3	5	..	..	..	..	..
Spanish	..	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..

Evening Session of 1904-5.

October 10 to May 19.

CALENDAR

FIRST TERM 1904				SECOND TERM 1905				THIRD TERM 1905			
Mon. & Th.		Tues. & Fri.		Mon. & Th.		Tues. & Fri.		Mon. & Th.		Tues. & Fri.	
OCTOBER				JANUARY				MARCH			
10	13	11	14	2	5	3	6	13	16	14	17
17	20	18	21	9	12	10	13	20	23	21	24
24	27	25	28	16	19	17	20	27	30	28	31
31	..	..	..	23	26	24	27	..	..	..	..
..	..	..	..	30	..	31	..	..	..	..	..
NOVEMBER				FEBRUARY				APRIL			
..	3	1	4	..	2	..	3	3	6	4	7
7	10	8	11	6	9	7	10	10	13	11	14
14	17	15	18	13	16	14	17	17	20	18	21
21	..	22	..	20	23	21	24	24	27	25	28
28	..	29	..	27	..	28	..	..	..	..	..
DECEMBER				MARCH				MAY			
..	1	..	2	..	2	..	3	1	4	2	5
5	8	6	9	6	9	7	10	8	11	9	12
12	15	13	16	..	..	..	..	15	18	16	19
19	..	20	..	..	..	..	..	..	..	..	..

The Institute is open from 7:30 to 9:30 four evenings a week. Some of the courses of instruction are given on Monday and Thursday evenings, others on Tuesday and Friday evenings. The courses are so arranged as to make it possible for a student to take one course and attend two evenings a week, or two courses and attend four evenings a week. The tuition for one course of instruction, two evenings a week, for a term of ten weeks, is five dollars; for two courses of instruction, four evenings a week, ten dollars. In addition to the tuition, a fee of five dollars a term is charged for laboratory and shop courses.

Schedule of Evening Classes for Session of 1903-4.

Instructors.	Courses of Instruction.	Room.	Evenings.	Terms.
Woodworth.	Electrical Engineeiing, Second Year.....	55	Mon. & Thu.	A. W. S.
Woodworth.	Engineering Principles, First Year.....	55	Mon. & Thu.	A. W. S.
DePuy.	Machine Shop Work	59	Four	A. W. S.
Moseley. ...	Engineering Mathematics	47	Tue. & Fri...	A. W.
Smith.	General Chemistry	68	Mon. & Thu.	A. W. S.
Rogers.	Engineering Principles...	72	Mon. & Thu.	A. W. S.
Rogers.	Electrical Engineering, Second Year.....	54	Mon. & Thu.	A. W. S.
Ross.	Pattern Making	79	Tue. & Fri...	A. W. A.
Bacon.	Advanced Mechanical Drawing	78	Mon. & Thu.	A. W. S.
Trowbridge.	Analytical Chemistry	66	Mon. & Thu.	A. W. S.
Schenck. ...	Machine Design.....	78	Tue. & Fri...	A. W. S.
Hawley. ...	Mechanical Drawing	96	Four	A. W.
Hawley. ...	Mechanical Drawing	96	Tue. & Fri...	S.
Nies.	Electrical Engineering, Third Year.....	39	Tue. & Fri...	A. W. S.
Taft.	Machine Shop Work	57	Four	A. W. S.
Smith.	Cookery for Nurses.....	67	Tue. & Fri...	A. W.
Wheeler....	Steam Engineering.....	B	Tue. & Fri...	A. W.
Wheeler....	Engineering Principles, First Yeai.....	48	Mon. & Thu.	S.
Bailey.	Mechanical Drawing	97	Mon. & Thu.	A. W. S.
Brown.	Cookery	65	Thu. & Fri..	A. W.
Colver.	English Grammer and Composition.....	21	Mon. & Thu.	A.
Forster.	Mechanical Drawing	76	Mon. & Thu.	A. W. S.
Gould.	German	41	Mon. & Thu.	A. W.
Heaney.....	Latin.....	40	Tue. & Fri...	A. W. S.
Henning. ..	Mechanical Drawing	97	Tue. & Fri...	A. W. S.
Hermans. ..	Strength of Materials....	51	Tue. & Fri...	A.
Hertz.....	Mechanical Drawing	76	Tue. & Fri...	A. W.
Hess.	English Grammar and Composition.....	27	Tue. & Fri...	A. W. S.
Hulbird.....	Electrical Engineering, Second Year	48	Mon. & Thu.	A. W.
Jackson.....	English and Algebra.....	22	Tue. & Fri...	A. W. S.
Lester.	Cookery	67	Mon. & Thu.	A. W. S.
Preston. ...	Physical Culture	11	Mon. & Thu.	A. W. S.
Robbins.....	Machine Sketching	95	Tue. & Fri...	A.
Sicard.	French	20	Mon. & Thu.	A. W.
South.....	Arithmetic	28	Four	A. W.
Staud.....	Spanish	22	Mon. & Thu.	A. W. S.
Thomas. ...	Advanced Algebra	26	Tue. & Fri...	A. W. S.
Tuck.	Algebra and Geometry...	27	Mon. & Thu.	A. W.
Utter.....	Electrical Engineering, Second Year	54	Mon. & Thu.	A. W.
Wicherski...	English Grammar and Composition.....	21	Mon. & Thu.	A. W. A.
Winters.....	Accounting & Penmanship	24	Four	A. W. S.

Special Evening Courses.

I. ENGINEERING PRINCIPLES AND PRACTICAL MATHEMATICS (*First year*).—One hour each evening given to lecture and one hour to solution of problems. This course is intended to meet the needs of students, mechanics, electricians, and all artisans who wish to obtain the basis for a reading knowledge of the fundamental principles common to the Mechanical Engineering branches. Great care is taken to present the topics in a clear, concise way in the simplest possible language.

II. ENGINEERING MATHEMATICS.—Algebra, Geometry, Trigonometry, and Graphical Calculus applied to Engineering Problems. The prerequisite is course I, practical mathematics, or its equivalent. This course is undertaken with the purpose of carrying the student further in mathematics, and the applications of mathematics to engineering problems. Much attention is given to graphical processes — their use in the study of forces, velocities, solution of equations, interpolation, mensuration, etc.

This course is planned to be of value to those who, in design, operation, or test, find that simple mathematical and graphical work gives them trouble.

III. STRENGTH OF MATERIALS AND STATICS.—The work is of both the class room and drawing room kind and treats the following subjects: Matter, force, equilibrium; representing a force; parallelogram, triangle and polygon of forces; parallel forces; moments, conditions for equilibrium of moments; center of gravity; moment of inertia, radius of gyration; stress and strain, modulus of elasticity; slope and deflection; limit of elasticity, ultimate resistance, modulus or rupture. The stresses in simple trusses and framed structures are studied.

IV. STRUCTURAL STEEL WORK. This course gives the student who has completed course VII a drill in the principles there acquired. By the study of current practice as displayed in specifications and designs, and the employment of his previous study he is enabled to undertake and complete satisfactorily in this course designs of plate and lattice girders, trusses, etc.

Courses III and IV, each of twenty weeks' duration, are planned to assist engineers, draftsmen, foremen, machinists, and others who are engaged in structural steel work and allied occupations.

V. ELECTRICAL ENGINEERING (*Second year*).—This course embodies the study of the following subjects with demonstration by the student: Construction and use of Wheatstone bridge; electrical energy lost in heat in incandescent lamp; determination of mean vertical, horizontal, and spherical candle power of incandescent lamp; proper rating and lamp target for incandescent lamp; efficiency and life determination of primary batteries; test of storage battery; resistance and ground by

voltmeter method; construction and use of tangent galvanometer; curves and constants for Siemen's dynamometer; conductivity tests of commercial copper; commercial efficiency of a D. C. motor; magnetic leakage of a dynamo; dynamo characteristics; electrical efficiency of D. C. arc lamps.

VI. ELECTRICAL ENGINEERING (*Third year*).—This course is arranged to meet the need of electrical artisans and technical school graduates. Among the subjects treated are: Alternating waves; resistance, reactance, and condensance, separately and in combination; power factor; vector method of representing alternating waves; single phase and polyphase transmission lines; single phase and polyphase induction motors; synchronus motors; rotary converters and transformers; transformer testing; two phase to three phase transformation; M-phase to N-phase transformation; metering of polyphase systems.

VII. STEAM ENGINEERING.—The following are among the subjects treated in this course: determination of strengths of materials; determination of stress and strain in a bridge truss; efficiency of simple machines; rope and chain tackle, test of a centrifugal machine, prony friction brake, cradle dynamometer test for an electric motor, work and efficiency of hydraulic ram; calculation of power; gas engine and calculation of power; calculation of condenser capacity; calculation of boiler capacity; calculation of pump capacity; calculation of ice machine capacity; taking indicator cards and calculating H. P.; boiler trial; engine friction and steam used; gas engine, trial and gas used per H. P.; various forms of prony brake; efficiency tests of injectors; calibration of steam gauges and thermometers; tests of steam pumps.

University Extension Lectures.

In 1903-04 the following lectures were given at the Institute on Thursday evenings.

I. Six Leaders of Social Liberty in England, by George Elliott Howard, Ph.D.

1. Oliver Cromwell, his place in the History of Intellectual Progress. 2. Lord Chatham, a Righteous Imperialist. 3. John Wilkes, a Statesman like Demagogue. 4. Lord John Russell, and Parliamentary Reform. 5. The Earl of Shafstbury, and Industrial Emancipation. 6. Richard Cobden, and Economic Emancipation.

II. The Music. Dramas of Richard Wagner, by Nathaniel I. Rubinkam, Ph.D., with music illustrations by Vernon D'Arnall.

1. Wagner until the completion of "The Flying Hollander." 2. "Tannhauser" and "Lohengrin." 3. "The Ring of the Nibelung." 4. "Tristan and Isolde." 5. "The Master Singers of Nuremberg." 6. "Parsifal."

III. Art and Daily Life, by John Quincy Adams, Ph.D.

1. What is Art? 2. Art and the Day's Work. 3. How to develop Art Appreciation. 4. Nervous Hygiene; or, Therapeutic effect of color and music. 5. Decoration of Schools. 6. Art in Literature.

IV. European Capitals and their Social Significance, by Jerome H. Raymond, Ph.D.

1. Madrid: The Evolution of Freedom. 2. Brussels: The Conflict with Clericalism. 3. Rome: The Passing of Authority. 4. Copenhagen: The Progress of the North. 5. Berne: The Triumph of Democracy. 6. Athens: The Revival of Hellenism. 7. Constantinople: Despotism and Revolutionism. 8. St. Petersburg: Autocracy and Nihilism. 9. Vienna: Feudalism and Democracy. 10. Berlin: Militarism and Socialism. 11. Paris: Liberalism and Nationalism. 12. London: Imperialism and Progressivism.

Announcement of courses of lectures for season of 1904-05 may be had on application.

Summer Session of 1904.

July 11 to August 19.

Three quarters and a summer term of six weeks make a school year of forty-two weeks, leaving ten weeks for vacation.

The courses of instruction in the Institute are so arranged that pupils who attend the summer term may, to that extent, shorten the total time requirement. It is manifestly to the advantage of those who remain in the city to devote to study a part of the twelve weeks of the summer.

The summer term gives an opportunity for those who wish to supplement work done in other schools with such instruction in science and the practical arts as the laboratory and shop equipment of the Institute make it possible to offer.

The summer term enables pupils who have fallen behind in the work of the year to make up deficiencies. Review classes are formed covering the work of each year in the high school in English, history, mathematics, physics, chemistry, Latin, Greek, German, and French.

The arrangement of classes is such as to make it possible for a pupil to complete one or two courses of instruction in the term of six weeks. The usual hours are from eight to twelve in the forenoon.

Any course of instruction offered by the Institute will be repeated in the summer if the demand is such as to justify the formation of a class.

The cost of instruction for the summer term is five dollars for one course, and ten dollars for two courses of instruction.

In physics and in chemistry, one course counts as two courses, because of the extra laboratory requirements.

Special Summer Circular may be had on application.

General Meetings, 1903-1904.

Sept. 30. Chapel. Address by Prof. E. H. Lewis.

Oct. 7. Allen C. Lewis Society. Speeches by representatives of student organizations.

Oct. 21. Chapel. Address by Judge C. C. Kohlsaat.

Nov. 4. Allen C. Lewis Society. Academic debate.

Nov. 18. Chapel. Musical program.

Dec. 2. Allen C. Lewis Society. Collegiate debate.

Dec. 16. Chapel. Address by Principal Louis J. Block.

Dec. 18. Presentation of "A Pair of Spectacles," by the Parnassian Society and the Collegiate Girls' Club.

Jan. 6. Chapel. Memorial services.

Jan. 20. Allen C. Lewis Society. Literary program.

Feb. 3. Chapel. Address by Pres. F. W. Gunsaulus, of Armour Institute.

Feb. 12. Chapel. Memorial services.

Feb. 17. Allen C. Lewis Society. Literary program.

March 11. Fifth Annual Concert of Musical Organizations.

March 16. Allen C. Lewis Society. Collegiate debate.

March 25. Presentation of Gilbert's "Sweethearts" and F. C. Beezley's "The Gulf Limited," by the Parnassian Society and the Collegiate Girls' Club.

April 6. Chapel. Address by Judge O. H. Horton.

April 15. Presentation of "The Private Secretary," by the Junior Dramatic Club.

April 20. Allen C. Lewis Society. Author's reading, by Wallace Rice, Esq.

May 4. Chapel. Addresses on athletics.

May 18. Allen C. Lewis Society. Collegiate debate.

May 25. Presentation of "Der Degen," by the German Club.

June 1. Allen C. Lewis Society. Academic debate.

June 15. Chapel. Address by Director Carman.

June 17 and 18. Presentation of "The Bells of Corneville," by the musical organizations.

June 23. Commencement.

June 24. Presentation of "A Bachelor's Romance," by the Parnassian Society and the Collegiate Girls' Club.

Seventh Annual Commencement.

June 23, 1904.

Degrees Conferred.

Mechanical Engineer.

Charles F. Henning.
William Garfield Hof.
Francis Howard Lane.
Harold H. Morgan.

Titles Conferred.

Associate in Arts.

Beatrice Medil Bell.
Anna T. Bergstrom.
Louise Marie Birkhoff.
Thomas Johnson Bolger.
Hazel Brown.
James V. Brown, Jr.
Merle Alice Bundy.
Alice Carey.
Portia Carnes.
Ruth Edna Chadwick.
Ellen Cleaves.
Josephine Margaret Clinnin.
Anna Louise Cottrell.
James Joseph Doyle.
James Arad Erwin.
Mattie Jane Gunthorp.
Rudolph Jonathan Irion.
Olga Jacobson.
Louise Millicent Kilner.
Harvey Brace Lemon.
Belle Maclean.
Clio Mamer.
Margaret Markey.
Eva McMahon.
Lewis Fillial Mead.
Nathaniel Perry Moerdyke.
Mathilda Nelson.
Edwin Griswold Nourse.
Lettice Wade Owen.
Edwin Stewart Pridham.
Harriet L. Robertson.
Elsie Charlotte Roome.
Claire Bertha Samels.
Fred Rullman Schaefer.
Cecile S. Schirmer.
Herman Spoehr.
Bessie Summerhays.
George Sheffield Titus.
Leah Grace VanBlarcom.
Arthur E. VanHagan.
Hattie C. Vannatta.
Susie W. Welch.
Bertha Wells.
Mildred E. Wiggins.
Wayland D. Wilcox.
Bess M. Everett Wilson.

Students in the School of Arts.

The names of students taking evening, summer, or special courses are not included in the following lists.

The figures after the names of students indicate the number of credits obtained at the end of the Winter Quarter, March 20, 1903, and completed without conditions, or credited to them on advanced standing. Students are classified as Associates, when they have received 144 credits, Candidates for Title of Associate, when they have 90 credits, and Candidates for Academic Certificate when they have less than 90 credits. For definition of credit, see page 25.

Associates in Arts.

Beezley, Charles F..... 156
Bussey, Irene W..... 159
Clark, Zoura..... 162
Doyle, Julia M..... 156
Dunwell, Minnie M..... 165
Forbes, Mabel F..... 159
Grafius, Marjorie..... 156
Hazelwood, Craig B..... 150
Mojonnier, Lydia..... 152
Roadifer, Ada E..... 156
Salisbury, Robert H..... 159
Schaefer, Doris M..... 156
Smyth, Agnes..... 161
Stephens, Alda..... 162
Street, Florence..... 161
Swenson, Beatrice L..... 177

Candidates for Title of Associate.

Albert, Chas..... 114
Aldridge, Mabel..... 108
Babb, Belle..... 106
Barrett, Rosamond E..... 102
Bartlett, Anna M..... 106
Bell, Beatrice..... 135
Benson, Charles L..... 111
Bergman, Ruth..... 108
Bergstrom, Anna T..... 140
Birkhoff, Louise..... 135
Bolger, T. Johnson..... 142
Bristol, George H..... 119
Brown, Hazel L..... 144
Brown, James V..... 146
Buechner, William A..... 96
Bundy, Merle A..... 147
Burggraf, Julia..... 114
Carey, Alice..... 136
Carnes, Portia..... 138
Carter, William A..... 98
Chadwick, Ruth..... 137
Clark, Mary A..... 99
Cleaves, Ellen..... 135
Clinnin, Josephine M..... 147
Collins, Winifred..... 104
Congdon, Hazel M..... 90
Costello, Eunice..... 99
Cottrell, Louise A..... 141

Croak, Frances..... 110
Davidson, Florence..... 96
Decker, Rosalie..... 99
Doyle, James J..... 138
Dudman, Jessie G..... 108
Eiszner, Adeline C..... 97
Erickson, Annette..... 94
Faust, George R..... 110
Fisk, Zoe E..... 111
Fraser, Violet..... 123
Garms, Lilia B..... 109
Gill, Bess..... 96
Goehring, Frank..... 107
Gunthorp, Martha..... 135
Hall, Edith..... 132
Hall, Mildred L..... 95
Harrington, Louise..... 111
Hatton, Mildred..... 112
Hausam, Winifred M..... 120
Henley, Mary..... 93
Hill, Laura W..... 120
Hoffman, Arthur C..... 109
Hoffman, Paul A..... 114
Hunter, Mabel R..... 92
Herwitz, Samuel H..... 99
Irion, Rudolph J..... 138
Jacobson, Olga..... 144
Jophes, Clara..... 108
Kane, Sarah F..... 106
Kilner, Louise M..... 142
Lawlor, Edwin D..... 115
Lemon, Harvey B..... 136
Lucas, Madeline D..... 105
MacLean, Belle..... 142
Mamer, Clio..... 137
Markey, Margaret..... 132
Martin, Charles P..... 91
Martin, Edwin..... 96
Mason, Lucile..... 126
Mather, Arlisle E..... 108
Maulsby, Carrie..... 96
McCallum, Edna M..... 108
McMahon, Eva..... 138
McMahon, Grace D..... 108
Mead, Lewis F..... 141
Meader, Amy K..... 100
Moerdyke, Perry..... 132
Moulton, C. Robert..... 104
Nelson, Mathilda..... 144
Nesslet, Estelle C..... 110
Nourse, Edwin..... 135
Owen, Lettice W..... 142
Pease, Theodore..... 113
Prehm, Ida..... 101
Robbins, Daisy..... 111
Robertson, Ella M..... 105
Robertson, Harriet L..... 140
Roeschlaub, Marguerite..... 112
Roome, Elsie C..... 136
Samels, Claire..... 138
Schaefer, Fred R..... 135
Schirmer, Cecile S..... 144
Scholes, Ethel..... 99
Schreiber, Elizabeth..... 108
Skiles, J. Hubert..... 108
Smith, Beatrice..... 90
Smith, Imogene..... 117
Southwick, June..... 108
Strawbridge, Mabel..... 100
Sullivan, Mary J..... 103
Summerhays, Bessie..... 135
Talcott, Frances..... 115
Titus, George S..... 135
Tower, Rosamond M..... 123
VanBlarcom, Leah G..... 133
Vannata, Hattie C..... 135
Wakefield, Nathan R..... 116
Wallace, Clara..... 99
Welch, Susie E..... 135
Wells, Bertha..... 135
Wetherell, Hattie E..... 108
Wiggins, Mildred E..... 137
Wilcox, Wayland D..... 135
Wilder, Harold..... 97
Wilson, Bess M. E..... 138
Wood, Anette E..... 105
Worthington, Ethel..... 117
Young, Calvin P..... 108

Candidates for Academic Certificate.

Ackley, Floyd N..... 16
Adair, Myrtle..... 16
Ahlswede, Ada D..... 63
Aldous, Aileen..... 6
Alexander, Lelia..... 16
Amacker, Anna..... 76
Amberg, Robert..... 56
Arthur, Mary..... 30
Aurand, Arthur G..... 15
Baker, Flossie..... 78
Balis, Grace..... 34
Baragwanath, Elsie..... 16
Barron, Marion..... 28
Baskerfield, Lucy..... 63
Bassett, Cyrus W..... 16
Bates, Alben F..... 66
Bernstein, Maurice..... 26
Beverley, William N..... 51
Becknell, C. Scott..... 32
Birkhoff, John H..... 16
Bishop, Arthur H..... 7
Bishop, Jessie E..... 52
Bishop, Mabel..... 32
Blatchford, John..... 22
Bottum Burt C..... 33
Brenton, Kennicott..... 65
Brosseau, Joseph..... 20
Brown, Christy..... 87
Burke, Alexander..... 48
Burlingame, Robert B..... 52
Burton, Harry E..... 8
Busse, John..... 8
Campbell, Margaret G..... 34
Carstens, Albert..... 14
Champion, Myrtle O..... 16
Chapman, Edith M..... 72
Chapman, Helen B..... 30
Ciucci, Florence..... 34
Clark, Earl P..... 56
Cleophas, Cornelia B..... 22
Cleveland, Carleton..... 43
Cohen, Fanny..... 16
Conrad, Edna..... 12
Cooperstein, Joseph..... 18
Covitz, Adolph..... 70
Coyne, Frederick E..... 16
Coyne, Jeanette..... 26
Crede, Louise..... 6
Dahl, Harold..... 61
Damuth, J. Florine..... 10
Darsie, Marvin..... 58
Dashiell, Juliet..... 66
Davis, Gladys..... 12
DeCamp, Grace F..... 47
DeWitt, Evelyn I..... 12
DeWitt, Helen C..... 34
Dilger, Alois R..... 16
Dooley, Gertrude..... 30
Dundas, J. Arthur..... 24
Eiszner, Bessie J..... 66
Ettelson, Geoffrey C..... 14
Falls, Frederick H..... 60
Faust, Clifford..... 18
Fleker, Myra..... 16
Fillmore, Mildred..... 16
Fitzgerald, Barrett..... 24
Flanders, Harvey H..... 88
Flanders, Junius..... 60
Fletcher, Erma E..... 40
Fortin, William H..... 12
Fox, Emily..... 59
Frake, Emily..... 54
Franzen, Edna..... 12
Fraser, Marjorie..... 62
Gainer, Ethel..... 6
Godwin, Robert F..... 30
Gottmann, Theodore M..... 10
Graham, Frank..... 68
Graham, Jarlath J..... 18
Graham, Ralph..... 52
Graves, Kate R..... 12
Green, Adah M..... 77
Griffin, James F..... 12
Griffin, Marybelle..... 34

Grout, Florence M..... 6
Gunderson, Ruth E..... 38
Haarvig, Effie M..... 48
Haas, George..... 10
Haenisch, Mamie F..... 16
Hagley, Lyman..... 29
Haines, Grace..... 65
Hallanger, Maurice..... 40
Hallenbeck, Eloise..... 63
Hammon, Ruth..... 12
Hankinson, Mary..... 8
Harned, Harry S..... 14
Harney, Nellie..... 32
Harper, George W..... 13
Harris, Nancy..... 30
Harris, E. Preble..... 74
Harvey, Madge..... 26
Harvey, Ruby M..... 57
Haugan, J. Richard..... 70
Hawxhurst, Ralph R..... 30
Hawxhurst, Waldo..... 8
Heaney, J. Ross..... 20
Heile, Robert..... 14
Hench, Horace..... 66
Herhold, Lydia..... 10
Hertz, Marguerite A..... 8
Highley, Patience..... 12
Hill, Leonard..... 48
Hinchliff, Alice..... 54
Hirsch, Harold..... 38
Holmes, O. Wendell..... 8
Hooker, Mildred E..... 12
Howe, Marjorie..... 61
Huber, William E..... 44
Hunter, Edna M..... 53
Huszagh, R. LeRoy..... 16
Huszagh, Victor L..... 16
Huth, Nydia..... 44
Ince, Bessie..... 38
Jenkins, Susie M..... 34
Jensen, Katharine..... 34
Jernberg, Prudence E..... 60
Jevne, Grace O..... 14
Joseph, Blanche..... 61
Judge, Frances C..... 85
Juve, Marie..... 15
Keeler, Ruth M..... 43
Kehl, Mabel A..... 46
Keiler, Arthur..... 30
Keirnan, Marie J..... 12
Kelley, Cora..... 72
Kimball, Russell H..... 16
King, George R..... 69
Kirton, J. Robert..... 15
Klaner, Fred A..... 18
Knox, Marion..... 18
Koop, Elsa..... 12
Krueger, Elsie M..... 12
Krueger, Fredrica D..... 55
Kubitz, Harvey..... 34
Kunkel, Lewis..... 80
Lamb, Vernon W..... 78
Larson, Lawrence C..... 15
Lindsay, Joseph A..... 12
Lorimer, Leonard..... 24
Lorimer, William..... 47
Lueders, August H..... 77
Main, Elsie..... 60
Mann, William M..... 50
Manning, Clarence E..... 83
Mark, Albert..... 32
Martin, Gail E..... 16
Masters, Ada..... 24
May, Rexford L..... 64
McCauley, Jennie..... 18
McCoy, Bessie C..... 15
McCreery, Vincent R..... 10
McDonnell, Edgar H..... 45
McMahon, Agnes..... 84
McNay, Gerald A..... 16
Melum, Helmer..... 22
Midgley, Edith L..... 16
Mikkelson, Elizabeth..... 12
Moody, Marie A..... 16
Moyer, Adele L..... 85
Nagl, Marie..... 12
Nelson, Norman A..... 10
New, Therese..... 37

t, Leroy W..... 34
, Harold..... 16
, Irene..... 16
, Ellis..... 18
, George R..... 36
on, John W..... 49
Frank J..... 36
n, Abraham..... 34
orf, Clarence..... 73
George..... 61
Meta..... 12
Thora..... 16
son, Caroline E..... 56
ghnessy, Isabel M.... 69
Theron..... 16
ı, Florence..... 88
Leigh..... 68
orma V..... 52
st, William L..... 20
n, Nettie..... 8
Irving..... 89
Rodney..... 16
, Ethel..... 14
Helen..... 34
Wilbur S..... 14
Susie..... 81
Magdalene..... 52
re, Eleda..... 42
Elsie..... 64
Eva..... 38
c, James R..... 32
Joseph..... 61
lson, Amanda..... 46
lson, Florence..... 39
n, Samuel..... 34
Hazel..... 56
on, Myra..... 36
Thomas..... 52
Capitola..... 8
n, Arthur D..... 40
er, Christian H..... 16
t, Royal J..... 89
r, Nathaniel..... 20
, Joan M..... 8
Shafer, M. Etta..... 22
Sherman, Oren G..... 48
Simington, Francis J..... 52
Simonds, Gertrude..... 37
Skinner, Murray M..... 11
Smith, Emory..... 19
Smith, Eugene..... 20
Smith, Hobart..... 81
Snite, Fred B..... 52
Snow, Edgar H..... 55
Sommerfeld, Otto..... 34
Sommers, Marie..... 32
Speed, Louise M..... 26
Starke, Charles H..... 50
Steinbrecher, Rose..... 14
Stepina, Ida M..... 63
Stoltze, Caroline..... 28
Swarts, Neva..... 70
Swissler, Edna..... 84
Swissler, William R..... 48
Szmergalski, Theodore..... 36
Taylor, Roy..... 35
Tevenan, Charles..... 8
Thatcher, Everett..... 44
Thomas, Hallie..... 8
Thomas, William C..... 8
Thompson, J. Clifford..... 64
Thompson, Elmer G..... 39
Thomson, Howard A..... 14
Thomson, Jennie..... 89
Thorndyke, Clara L..... 47
Thorp, Leroy M. I..... 10
Titus, Robert..... 16
Tower, Raymond C..... 52
Towers, Walter K..... 62
Townsend, Josephine..... 12
Triner, Camilla..... 16
Trout, Thomas W..... 57
True, Charles..... 25
Touhy, Arthur C..... 34
Ulhorn, Walter..... 40
Varnell, George M..... 33
Vehrs, Elsie..... 20
Volk, Carl..... 16

Vopicka, Victoria A..... 20
Walker, Robert G..... 58
Wallace, Florence..... 22
Wathier, Ethel..... 9
Wegg, David S..... 28
Weil, Henry T..... 13
Weisfeld, Yetta..... 10
Wells, S. Cecilia..... 36
Wernicke, Harry..... 87
Westfall, Charles..... 61
White, Helen..... 83
Wilder, Lawrence R..... 65
Williams, Noble..... 53
Williams, Robert..... 4
Wilson, Grace..... 12
Withey, Edward L..... 14
Wolf, Robert N..... 30
Wolfenstetter, Ethel J..... 22
Yampolsky, Jacob..... 78
Yampolsky, Rebecca..... 53
Yaxley, Leona B..... 16
Young, Everett G..... 8
Zahn, Anna M..... 44
Zahn, Louise..... 8

Unclassified Students.

Albrecht, L. Maude.
Albro, Keziah R.
Ameen, Mirza.
Anderson, Gustave.
Baumgart, Frank.
Borgnier, Alice M.
Burwash, Elvira T. J.
Butterfield, Buell F.
Davis, Olive E.
Drott, Raphael S.
Edstrom, Edward E.
Ehrman, Lillian.
Foote, Orra.
Fuelling, Alma.
Gaarder, Bertha.
Gatter, Louise.
Geerdes, Emma A.
Gimbel, Ida K.
Goldberg, Minnie.
Gordon, Bertha F.
Grau, Maud.
Harrington, Fred.
Hassett, Alice U.
Hazzard, Ocie M.
Hewes, Hazel.
Hogenson, William P.
Holland, John A.
Johnson, Chester.
Kammerling, Walter W.
Kellogg, Elsie.
Knobel, Elizabeth.
Lewis, Ruth S.
Lohner, Aaste.
Lovelock, Maud.
MacLachlan, Allan F.
Maher, Irene.
McCurdy, Emily F.
Medwedeff, Sophia.
Melandy, Emma L.
Middleton, Dale.
Miksak, Emily A.
Murdock, Winifred D.
Nelson, Ellen C.
O'Leary, Anna.
Rollins, Persis.
Rudd, John S.
Rudd, Naomi.
Schmidt, Hilmer C.
Seelye, Ida.
Servis, Howard H.
Shoecherger, Louise.
Spencer, Mariam.
Stanford, Mary V.
Stickel, Joseph.
Sutor, Grace.
Taylor, May.
Uecke, Florinda.
Ward, Irene.
West, Maurice E.
Wilkins, Louis.

:nts in School of Engineering.

ıes of students taking evening, summer, or special courses
luded in the following lists.

are classified as Candidates for the Degree of M. E., when
ɔo or more credits, and Candidates for the Academic Cer-
:n they have less than 90 credits.

ındidates for the Degree of M. E.

arles W..... 108
ıter M..... 90
ık L..... 90
ıtio..... 90
arl E..... 90
ɔimon..... 117
ıes A..... 149
ıs, James A..... 99
laine..... 100
Valter..... 163
Clinton H..... 97
ırry N..... 105
chael J..... 110
ne C..... 115
Fred..... 119
ed L..... 110
bert F..... 108
Charles F..... 192
is H..... 154
lis G..... 97
ım G..... 191
Vernon L..... 90
er N..... 112
Vincent..... 109
ieorge L..... 123
ace N..... 99
Joseph..... 126
ıamuel J..... 120
ırold..... 102
illiam M..... 149
us..... 155
les..... 117
harles R..... 117
Howard..... 202
Larimer, Robert..... 105
Main, George A..... 180
Merrill, Frank..... 198
Millard, Chauncey S..... 119
Miller, John F..... 92
Morgan, Harold..... 197
Musser, Martin E..... 107
Olson, Charles..... 104
Osgood, Charles..... 110
Parsons, Eugene W..... 114
Pridham, Edwin..... 133
Pusey, William C..... 121
Reid, Hugh M..... 108
Riffel, Bernhard..... 148
Ritchie, Prescott..... 90
Robbins, Harold..... 153
Singer, David..... 127
Smyth, John U..... 98
Sommerfeld, Waldo..... 115
Spoehr, Herman..... 140
Stone, Porter E..... 93
Strauss, Walter O..... 105
Sullivan, William T..... 103
Thelin, Victor E..... 90
Todd, Emery..... 117
Tolsted, Elmer..... 142
VanHagan, Arthur E..... 148
Weaver, Harold P..... 141
Wheaton, Jesse R..... 94
Wig, Rudolph J..... 112
Wilder, George G..... 90
Williamson, Alexander L.... 118
Wolcott, Kenneth O..... 94

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Candidates for Academic Certificate.

Adkins, George A..... 16
Ahlschlager, Walter..... 76
Alder, William..... 18
Allan, William..... 16
Allen, Harry B..... 81
Amerman, Carl..... 44
Arp, Clarence K..... 60
Arthur, Robert S..... 60
Ashby, Raymond C..... 30
Ashby, Wilbert..... 60
Augensen, Eugene..... 16
Baethke, Edward J..... 4
Bain, Arthur..... 77
Baird, Warner..... 82
Bartik, Edward..... 16
Baskerfield, Harry..... 82
Bauerle, Walter E..... 40
Baumann, Alfred..... 16
Baumer, Ernest..... 4
Baur, William..... 10
Beckwith, James L..... 49
Beam, Harry W..... 20
Blahnik, Karel B..... 58
Bloss, Eugene..... 36
Bonnell, Frank G..... 51
Bourgeois, Borel O..... 34
Bradford, Clarkson..... 82
Brannum, James H..... 47
Bray, William J..... 18
Bringe, William H. R..... 10
Bronson, Fred B..... 58
Brown, J. Warren..... 33
Callaghan, John J..... 11
Carpenter, Frank G..... 58
Carroll, Charles H..... 98
Chapman, George N..... 28
Chiville, Gerald D..... 46
Clark, Delmer..... 32
Clark, James R..... 38
Clark, Wesley..... 4
Cohn, David..... 65
Connell, James..... 18
Conway, James..... 80
Corboy, John..... 18
Cox, James W..... 40
Coyne, J. Joseph..... 39
Cross, Hugh F..... 27
Curtis, Arthur J. R..... 38
Darnall, C. Allen..... 18
Davenport, F. Earl..... 50
Davidson, Albert J..... 73
Delves, Abraham..... 26
Deming, Robert O..... 12
Denton, Norman L..... 48
Dieckman, Albert..... 82
Dierson, Walter..... 34
Diven, Carlyle..... 38
Doane, Joseph..... 12
Donahue, Matthew..... 38
Doyle, Horace..... 67
Dugan, Charles..... 32
Dyar, H. Huntington..... 36
Ebner, Alfred..... 83
Eggert, George F..... 48
Evans, Harold..... 26
Evertsen, Christian..... 64
Farnham, Edwin W..... 41
Fitzer, Arthur..... 34
Fitzpatrick, Arthur..... 22
Foley, J. Allen..... 61
Forbes, James S..... 65
Ford, Francis L..... 26
Forsman, Roy..... 32
Freiberg, Louis..... 34
Fritts, William W..... 54
Furst, George F..... 16
Galbraith, Alonzo..... 41
Gleeson, Frank G..... 11
Glore, Charles F..... 8
Golden, Walter..... 14
Gordon, Grant D..... 26
Gordon, Mandel..... 25
Goss, LeRoy..... 38
Grace, John G..... 30

Victor F..... 12
ı, Harry T..... 28
Charles B..... 57
Grantley..... 61
ınd, Ulrich..... 44
Ralph..... 38
Vilham L..... 28
ın, George..... 42
ɔn, Charles H..... 28
:k, Edwin..... 84
ı, Henry N..... 16
ı, Edwin O..... 73
, Fred C..... 85
n, John R..... 64
ɔn, Charles I..... 26
', Arthur H..... 36
', Louis..... 40
Lawrence..... 34
', Clemens..... 16
ıs, Ray W..... 10
William H..... 14
William C..... 24
g, Arthur..... 54
n, Alfred..... 32
ı, Albert B..... 40
Raymond D..... 12
erg, Alfred V..... 32
y, Charles A..... 80
Howard..... 70
:in, Paul..... 65
d, Robert..... 59
d, William R..... 20
ss, Arthur..... 63
Edwin F..... 12
Will O..... 57
ı, Fred V..... 18
ı, Claude C..... 36
ı, Edgar..... 32
George L..... 47
n, Augustus T..... 12
Arthur..... 47
Lambert A..... 38
Robert J..... 40
Thomas J..... 36
Kelly, John..... 11
Kemnitz, Ernest..... 28
Kempton, LeRoy C..... 8
Keyes, Blair L..... 42
Kirchman, Maximilian L..... 24
Kissinger, Alexander..... 18
Kistenbroker, Arthur W..... 52
Kittredge, Alfred R..... 54
Knapp, Allan W..... 12
Koepke, Frank O..... 40
Koerber, Andrew..... 6
Kopf, Melrose G..... 65
Korup, Christian..... 38
Kurfess, George..... 38
Kurtz, Robert..... 38
LaMontaine, Sidney J..... 38
Latta, Smith..... 76
Leitner, Charles B..... 26
Leufstedt, Eric..... 14
Levey, Clarence..... 67
Libbey, T. Herbert..... 68
Lindquist, Frederick H..... 38
Link, Emery R..... 14
Littleford, Frank J..... 81
Loeding, George..... 16
Lukey, Loren..... 28
MacLeod, Norman L..... 16
MacVicar, Malcolm..... 33
Maguire, William..... 42
Maple, Omar S..... 34
Marsh, Russell..... 42
Martin, Edward P..... 80
McCabe, Charles..... 50
McCarthy, Emmett..... 16
McChesney, J. Sherman..... 64
McGann, Edward..... 68
McLeod, William J..... 18
McWhirter, David A..... 24
Meyer, Harry..... 8
Miller, Robert H..... 26
Millholland, Ernest..... 30
Millholland, William..... 77
Moffett, Frank E..... 24
Moore, George R..... 44

Morgan, Edward J..... 79
Moste, Maurice..... 26
Moulton, Walter R..... 80
Muench, George W..... 66
Murray, Francis V..... 80
Nicholl, William B..... 55
Niemann, Fred..... 44
Nolander, Walter..... 24
Northrop, H. Richey..... 18
Nyman, Carl..... 28
O'Connor, James..... 32
O'Donnell, Fred..... 50
Olson, Roy H..... 16
Olson, Theodore F..... 16
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Schaub, William F..... 55
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Schmidt, Walter..... 14
Schonert, J. William..... 73
Schram, John W..... 32
Schram, William F..... 26
Schulkins, Arthur..... 18
Schulz, William..... 7
Schweiger, Edwin..... 5
Seyferlich, Edgar..... 1
Sharp, Augustus W..... 1
Sherman, Victor.....
Simonds, Herbert R.....
Skiles, Frank.....
Skooglund, David.....
Smail, Elmer S.....
Smith, Charles F.....
Smith, Edward A.....
Smith, A. Warren.....
Soucek, Edward.....
Stearns, Irving.....
Stewart, Raye.....
Stoetzel, William.....
Storer, Horace P.....
*Sutton, Harry B.....
Taylor, Percy.....
Thompson, Roy S.....
Tischer, Arthur H. V.....
VanHouten, Walter M.....
Visher, Stephen S.....
Vockel, Clarence.....
VonPlachecki, Emil.....
Wakefield, Lloyd.....
Wales, Henry S.....
Wallace, Robert B.....
Warr, Harold G.....
Warrington, Chester.....
Watson, Carl.....
Watson, William.....
Weeks, Robert E.....

*Deceased.

t, Max..... 79
George..... 41
rg, Oscar A..... 37
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dt, Raymond C..... 88
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ns, Meredith..... 80
ns, Raymond G..... 38
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Unclassified Students.

, William H.
William.
Roy.
ar, Robert C.
on, Ben.
lt, Adolph.
, Edward B.
s, C. Garcia.
n, Edward.
Cornelius.
Charles.
gton, George S.
rd, Allen.
s, Arthur.
n, George A.
ick, George H.
l, Roy.
vig, Henry.
iz, Edward.
en, Henry W.
Lindner, Herman.
Miller, Henry.
Miller, Warren E.
Moestue, Thoralf.
Nash, George R.
Nieman, Clemens.
Olsen, Oscar O.
Richards, Robert T.
Robbel, William G.
Schad, Fred.
Schillinger, Fred A.
Schwimm, Fred.
Sherwood, Benjamin W.
Smith, Robert E.
Stewart, Floyd.
Sturm, Grant.
Sykes, Grover.
Utter, Richard I.
VanPlew, James.
Walker, Ralph.

Summary of Attendance.

The School of Arts.

Associates in Arts	16
Candidates for the Title of Associate	116
Candidates for the Academic Certificate	284
Unclassified Students	60
Special and Summer Students	226
Students in Day Classes	702
Students in Evening Classes	575

The School of Engineering.

Candidates for the Degree of M. E.	67
Candidates for the Academic Certificate	289
Unclassified Students	40
Special and Summer Students	76
Students in Day Classes	472
Students in Evening Classes	579

Total Attendance.

Day Students in the Institute	1174
Evening Students in the Institute	1154
Total	2328

MISSELLED

LEWIS INSTITUTE

NINTH ANNUAL REGISTER

CHICAGO

1905

Summary of Attendance.

The School of Arts.

Associates in Arts	16
Candidates for the Title of Associate	116
Candidates for the Academic Certificate	284
Unclassified Students	60
Special and Summer Students	226
Students in Day Classes	702
Students in Evening Classes	575

The School of Engineering.

Candidates for the Degree of M. E.	67
Candidates for the Academic Certificate	289
Unclassified Students	40
Special and Summer Students	76
Students in Day Classes	472
Students in Evening Classes	579

Total Attendance.

Day Students in the Institute	1174
Evening Students in the Institute	1154
Total	2328

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NINTH ANNUAL REGISTER

CHICAGO

1905

NINTH ANNUAL REGISTER

OF THE

LEWIS INSTITUTE

FOUNDED BY ALLEN C. LEWIS

DEVOTED TO

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TECHNOLOGY

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CORPORATION.

OFFICERS.

CHRISTIAN C. KOHLSAAT, *President.*

THOMAS KANE, *Vice-President.*

JOHN McLAREN, *Secretary and Treasurer.*

TRUSTEES.

BERNARD A. ECKHART,
OLIVER H. HORTON,
THOMAS KANE,
CHRISTIAN C. KOHLSAAT,
JOHN McLAREN.

BOARD OF MANAGERS.

GEORGE N. CARMAN,
BERNARD A. ECKHART,
WILLIAM R. HARPER,
JAMES B. HERRICK,
OLIVER H. HORTON,
EDMUND J. JAMES,
THOMAS KANE,
CHRISTIAN C. KOHLSAAT,
ALBERT G. LANE,
JOHN McLAREN,
ADDISON E. WELLS.

BUSINESS AGENT, WILLIAM H. HALL.

Calendar 1905-1906.

July 10, Monday—Summer Session begins.

Aug. 18, Friday—Summer Session ends.

Sept. 11-15, Monday to Friday—Final Examinations for Admission.

Sept. 18, Monday—Autumn Quarter begins for students who have not heretofore been in attendance at the Institute. Recitations for one week as a basis for permanent classification.

Sept. 25, Monday—Autumn Quarter begins for students who were in regular attendance during the year 1904-1905.

Oct. 2-6, Monday to Friday, Evenings—Registration and Classification of Candidates for admission to Evening Classes.

Oct. 9, Monday—Evening Classes begin.

Nov. 23-24, Thursday and Friday—Thanksgiving Recess.

Dec. 15, Friday—Autumn Quarter ends.

Holiday Recess for two weeks.

Jan. 2, Tuesday—Winter Quarter begins.

Feb. 22, Thursday—Washington's Birthday—a Holiday.

March 23, Friday—Winter Quarter ends.

Quarterly Recess for one week.

April 2, Monday—Spring Quarter begins.

May 30, Wednesday—Memorial Day—a Holiday.

June 9, 16, 23, Saturdays, from 9 A. M. to 1 P. M.—Preliminary Examinations for Admission.

June 22, Friday—Spring Quarter ends.

FACULTY.

George Noble Carman, Director.

A. B., University of Michigan, 1881; Principal, Ypsilanti (Mich.) High School, 1880-82; Superintendent of Schools, Union City, Mich., 1882-85; Principal, Brooklyn (N. Y.) Grammar School No. 15, 1885-89; Principal, St. Paul (Minn.) High School, 1889-93; Dean of the Academy of the University of Chicago, Morgan Park, Ill., 1893-95.

William Albert Greeson, Professor of Mathematics, and Dean of the Faculty.

A. B. and A. M., University of Michigan, 1879; Principal, Flint (Mich.) High School, 1879-81; Instructor in Grand Rapids (Mich.) High School, 1881-85; Principal of Grand Rapids (Mich.) High School, 1885-96.

Edwin Herbert Lewis, Professor of English.

A. B., Alfred University, 1887; A. M., *ibid.*, 1887; Senior Teacher, Vice-Principal, Plainfield (N. J.) High School, 1887-88 and 1889-90; Student in Italian libraries, 1888-89; Professor of Latin, Alfred University, 1890-92; Ph. D., Syracuse University, 1892; Fellow in English, University of Chicago, 1892-93; Assistant in Rhetoric, *ibid.*, 1892-94; Ph. D., University of Chicago, 1894; Instructor in Rhetoric, *ibid.*, 1894-96; Associate Professor, *ibid.*, 1896-99; Associate Professor, Lewis Institute, 1896-99; Litt. D., Milton College, 1905.

Paul Mellen Chamberlain, Professor of Mechanical Engineering.

B. S., Michigan Agricultural College, 1888; M. E., Cornell University, 1890; with Brown Hoisting and Conveying Machine Co., Cleveland, Ohio, 1889-90; Assistant Engineer with Frick Co., Waynesboro, Pa., 1890-92; Mechanical Engineer for Hercules Iron Works, 1892-93; Assistant Professor Mechanical Engineering, Michigan Agricultural College, 1893-96; Assistant Professor of Mechanical Engineering, Lewis Institute, 1896-99; Member of American Society of Mechanical Engineers; Member of Western Society of Engineers.

Charles Wesley Mann, Professor of History.

A. B., De Pauw University, 1887; A. M., *ibid.*, 1888; Instructor in Mathematics and French, De Vaux College, N. Y., 1887-88; Instructor in Mathematics, and Superintendent, Kenyon Military Academy, Gambier, Ohio, 1888-91; Associate Principal, Illinois Military Academy, Morgan Park, 1891-92; Dean of Chicago Academy, 1893-96; Assistant Professor of History, Lewis Institute, 1896-1900.

PHILIP BELL WOODWORTH, Professor of Physics and Electrical Engineering.

B. S., Michigan Agricultural College, 1886; M. E. in Electrical Engineering, Cornell University, 1890; with Brush Electric Co., Cleveland, Ohio, 1889-90; Student in University of Berlin, 1891-92; Assistant Professor in charge of Physics and Electrical Engineering, Michigan Agricultural College, 1892-99; Assistant Professor of Physics and Electrical Engineering, Lewis Institute, 1899-1901; Member of American Institute of Electrical Engineers; Member of Western Society of Engineers.

CLARENCE ELBERT DEPUY, Professor of Mechanical Engineering and Shop Work.

B. S. in Mechanical Engineering, University of Michigan, 1891; in Machine Shop of Dennis Machine Co., Jackson, Mich., 1883-87; Instructor in Machine Shop, Chicago Manual Training School, 1891-96; Member of American Society of Mechanical Engineers.

ALEXANDER WILLETT MOSELEY, Professor of Applied Mechanics.

S. B., Massachusetts Institute of Technology, 1891; Draftsman, World's Columbian Exposition, Chicago, 1891-93; with Webster Mfg. Co., Chicago, 1894-95; Chief Draftsman, Atlanta Exposition, summer 1895; Instructor in Mechanical Engineering, Massachusetts Institute of Technology, 1895-99; with Wm. Sellers & Co., Philadelphia, 1899; Assistant Professor of Mechanical Engineering, Michigan Agricultural College, 1900; Member of American Society of Mechanical Engineers; Member of the Western Society of Engineers; Member of the American Society for Testing Materials.

WARREN RUFUS SMITH, Professor of Chemistry.

A. B., Bowdoin College, 1890; Ph. D., University of Chicago, 1894; Instructor in Science, Leicester Academy, Leicester, Mass., 1890-91; Scholar in Chemistry, Clark University, 1891-92; Fellow in Chemistry, University of Chicago, 1892-94; Assistant in Chemistry, Bowdoin College, 1894-95; Instructor in Science, New Bedford High School, New Bedford, Mass., 1895-96; Instructor in Chemistry, Lewis Institute, 1896-1900.

*HERBERT EDGAR COBB, Professor of Mathematics.

A. B., Wesleyan University, 1887; A. M., *ibid.*, 1890; Instructor in Mathematics, Maine Wesleyan Seminary and Female College, 1887-90; Instructor in Mathematics, University of Colorado, 1890-92; Graduate Student in Mathematics and Lecturer in University Extension Division, University of Chicago, 1892-96; Instructor in Mathematics, Lewis Institute, 1896-99.

JAMES WALTER FERTIG, Assistant Professor of History.

A. B., University of Nashville, 1890; A. M., *ibid.*, 1891; Graduate Student in History, Vanderbilt University, 1891-92; Instructor in History and Mathematics, Montgomery Bell Academy, Nashville, 1891-93; Graduate Student in History and Political Science, University of Chicago, 1893-97; Fellow in History, *ibid.*, 1894-97; Lecturer in the Extension Department, *ibid.*, 1895-96; Ph. D., *ibid.*, 1897; Professor of History, University of Arkansas, 1898-99; Instructor in History, Lewis Institute, 1899-1902.

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*Absent on leave, 1905-06.

JOSEPH RALEIGH NELSON, Assistant Professor of Latin.

A. B., University of Michigan, 1894; Instructor in Latin in John Marshall High School, Chicago, 1894-1900; Instructor in Latin, Lewis Institute, 1900-02; Graduate Student in Latin, University of Michigan, 1902-03; A. M., University of Michigan, 1903.

FRED A. ROGERS, Assistant Professor of Physics and Electrical Engineering.

B. S., in Electrical Engineering, University of Michigan, 1894; Electrical Engineer for Vermillion Milling and Electric Co., Vermillion, S. D., 1895-96; Assistant in Physics, Lewis Institute, 1896-97; Instructor in Physics and Electrical Engineering, *ibid.*, 1897-1902; Member of Western Society of Engineers.

JESSIE LOUISE JONES, Assistant Professor of German.

A. B., Doane College, 1884; Graduate Student University of Michigan, 1894-95; Student in Berlin and Paris, 1888-90; Teacher in Jacksonville Female Academy, 1890-93; Teacher of German, Chicago Preparatory School, 1893-94; Teacher of German, Chicago Female College, 1894-95; Fellow, University of Chicago, 1895-96; Ph. D., *ibid.*, 1897.

GEORGE LEE TENNEY, Assistant Professor of Latin.

A. B., Denver University, 1894; Principal, High School, Manitou, Colo., 1894-96; Instructor in Latin, Denver Manual Training High School, 1896-99; Graduate Student in Latin, University of Chicago, 1899-1900; A. M., University of Denver, 1900; Instructor in Latin, Denver Manual Training High School, 1900-02; Instructor in Latin, Lewis Institute, 1902-03.

DUANE STUDLEY, Assistant Professor of Mathematics.

B. S., Cornell University, 1881; Principal, School, Corfu, N. Y., 1881-82; Instructor in High School, Cleveland, Ohio, 1882-86; Graduate Student, Cornell University, 1886-87; Instructor in Mathematics and Astronomy, *ibid.*, 1887-92; Professor of Mathematics, Wabash College, 1892-1901; Professor of Mathematics, Kalamazoo College, 1901-03.

CHARLES EMERSON PEET, Assistant Professor of Physiography.

B. S., University of Wisconsin, 1892; Fellow in Geology, University of Chicago, 1892-95; Assistant, New Jersey Geological Survey, 1891-95; Assistant, U. S. Geological Survey, 1895-97; Instructor in Geology and Physical Geography, Englewood High School, 1897-99; Instructor in Physiography, Lewis Institute, 1899-1905.

PHILEMON BULKLEY KOHLSAAT, Assistant Professor of English.

Ph. B., University of Chicago, 1894; Teacher in Chicago Heights High School, 1894-95; Instructor in Latin, Chicago Academy, 1895-96; Fellow in English, University of Chicago, 1897-99; Instructor in English, Lewis Institute, 1896-97 and 1899-1905.

LEWIS GUSTAFSON, Assistant Professor of English, and Registrar.

A. B., University of Chicago, 1900; Assistant in English, Lewis Institute, 1897-1900; Instructor in English, *ibid.*, 1900-05.

BERKELEY JOHN THOMAS, Assistant Professor of Mathematics.

A. B., Emory and Henry College. Va., 1887; B. S., Fountain City Normal College, Tenn., 1888; Principal, Spencer High School, Ky., 1888-91; Scholastic Fellow, Vanderbilt University, 1891-92; A. M., *ibid.*, 1892; Professor of Mathematics, Wofford College, S. C., 1892-95; Associate Professor of Mathematics, Armour Institute of Technology, 1895-99; Graduate Student, University of Chicago, and Lecturer in Mathematics in the Extension Division, 1899-1901; Teacher of Mathematics in the South Side Academy, and Assistant Principal of Teachers' Review School, Chicago, 1901-02; Head Teacher of Mathematics, Oak Park High School, 1902-05.

LEA RACHEL DELAGNEAU, Instructor in French.

Instructor in French, Chautauqua, N. Y., 1887-92; Instructor in French, Morgan Park Academy, 1893-95; Instructor in French and History in High School, Ottawa, Ill., 1888-96.

LOUIS EDWARD POPE, Instructor in Mathematics and Accounting.

Accountant for Bayfield Brownstone Co. and R. D. Pike, Wholesale Lumber, Bayfield, Wis., 1886-91; Instructor in Arithmetic and Bookkeeping in High School, St. Paul, Minn., 1891-96.

HELEN DOUGAL STREET, Instructor in Greek and Latin.

A. B., University of Wisconsin, 1876; A. M., *ibid.*, 1879; Instructor in High School, Madison, Wis., 1877-81; Instructor in Latin, University of Wisconsin, 1883-84.

GEORGE ALEXANDER ROSS, Instructor in Woodwork.

Instructor in Woodwork, Chicago Manual Training School, 1890-93; Instructor in Woodwork, Jewish Training School, Chicago, 1893-98.

CHARLES EDGAR HOYT, Instructor in Foundry Work.

Instructor in Foundry Work and Pattern Making, Michigan Agricultural College, 1894-98; with Walker Manufacturing Company, Cleveland, Ohio, summer of 1897.

EDWARD BURTON DEGROOT, Instructor in Physical Culture.

Physical Director, Montclair Military Academy, 1891-97; Special Instructor, Harvard University Summer School of Physical Training, 1897; Student, Medical College of Virginia, 1897-98; Instructor in Physical Culture, Lewis Institute, 1899-1904; Superintendent of Gymnasiums, etc., for South Park Commission, 1904-05.

MARIE ELSA BLANKE, Instructor in Freehand Drawing.

Graduate of the Art Institute, Chicago.

JOHN LORD BACON, Instructor in Forge Work.

Graduate of Chicago Manual Training School, 1896; with Illinois Steel Co., 1896; with Marine Iron Works, 1896-98; Junior Member of American Society of Mechanical Engineers.

JULIA DUMKE PEET, Instructor in German.

Ph. B., University of Chicago, 1898; Student at University of Berlin, 1897-98; Assistant Principal in High School, Belle Plaine, Iowa, 1891-93.

Dic Hector Trowbridge, Instructor in Chemistry.
B. S., University of Michigan, 1898; Instructor in Adrian (Mich.) High School, 1898-99; Assistant in Chemistry, University of Michigan, summers, 1899-1900.

Charles Schenck, Jr., Instructor in Mechanical Drawing.
Student at University of Illinois, 1896-98; Draftsman with Troy Laundry Machinery Co., 1898-99; with W. S. McKinney, Mechanical Engineer, 1899; with Chicago Union Traction Co., Engineering Department, 1899-1901; with Purdy & Henderson, Civil Engineers, 1901; Junior Member of American Society of Mechanical Engineers.

***Edward Herman Lay, Instructor in Mathematics.**
A. B., Yale University, 1894; Instructor in Mathematics, West Jersey Academy, 1895-96; New York Military Academy, 1896-97; Buckley High School, 1897-98; Graduate Student, University of Chicago, 1898-99; Principal, Buchanan College, Troy, Mo., 1899-1900.

Anna Forster, Instructor in German and French.
Graduate of Royal Seminary, Breslau, Germany, 1872; Instructor in German and French, Hillside School, Wisconsin, 1896-98.

William Parker Hawley, Instructor in Mechanical Drawing.
B. S., Michigan Agricultural College, 1892; Student, Cornell University, summer, 1899; Machinist with Troy Laundry Machinery Co., 1895-96; Draftsman with Coe Typesetting Machine Co., 1896-98; Teacher of Manual Training, Chicago Public Schools, 1898-1901; Draftsman, Ordnance Office, Washington, D. C., 1901; Junior Member of American Society of Mechanical Engineers.

John Derk Nies, Instructor in Physics and Electrical Engineering.
B. S., Michigan Agricultural College, 1894; with Municipal Lighting Plant, Holland, Mich., 1894-1901; Student, Cornell University, 1900; Member of American Institute of Electrical Engineers.

Robert Henry Taft, Instructor in Machine Shop.
Graduate of English High and Manual Training School, Chicago, 1894; with Miehle Printing Press Mfg. Co., 1894-1901.

Mary Moulton Smith, Instructor in Domestic Economy.
Graduate of Gannett Institute, Boston, 1888; Associate in Science, Lewis Institute, 1902.

Sara Anna Janson, Instructor in Hygiene.
Graduate of Mankato (Minn.) State Normal School, 1892; Assistant Principal of High Schools, Little Falls and Brainard, Minn., 1892-97; B. S., University of Chicago, 1900; Instructor in Minn. State Teachers' Training School, summer, 1901-02; M. D., Rush Medical College, 1903.

Jesse Myron Owen, Instructor in English.
Ph. B., Iowa College, 1900; Instructor in English, French, and German in Ashland (Ky.) High School, 1900-01; Instructor in English and History in Drury College Academy, 1901-02.

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*Absent on leave, 1904-05.

KATE BELLE MILLER, Instructor in English.
Ph. B., University of Chicago, 1902.

HERBERT MERRILL WHEELER, Instructor in Mathematics.
B. E. E., University of Minnesota, 1896; with Fort Wayne Electrical Works, 1896-98; with Engineering Department of Chicago Union Traction Company, 1898-1903.

ETHEL PERCY ANDRUS, Instructor in English.
Associate in Literature, Lewis Institute, 1902; Ph. B., University of Chicago, 1903.

JOSEPH EDWARD HORA, Instructor in Chemistry.
Associate in Science, Lewis Institute, 1902; B. S., University of Chicago, 1903.

GEORGE PLIMPTON ADAMS, Instructor in Philosophy and Biology.
A. B., Harvard University, 1903; Student in Chicago Theological Seminary and in the University of Chicago, 1903-04.

KATHARINE I. INGERSOLL, Instructor in Domestic Economy.
Student at Oberlin College, 1887-89; Teacher in Denver Public Schools, 1893-1903.

HENRY WEBB BREWSTER, Instructor in Mathematics.
A. B., University of Minnesota, 1887; Assistant Principal, School of Agriculture of University of Minnesota, 1888-93; Ph. D., University of Minnesota, 1893; Principal of School of Agriculture, University of Minnesota, 1893-1900.

WARREN STONE GORDIS, Instructor in Latin.
A. B., University of Rochester, 1888; A. M., *ibid.*, 1891; Professor of Latin, John B. Stetson University, 1888-90; Fellow in Latin, University of Chicago, 1894-95; Instructor in Latin, *ibid.*, 1898-99; Instructor in Latin, Lewis Institute, 1899-1900; Instructor in Latin and History, The Bradstreet School, Rochester, N. Y., 1900-03; Graduate Student, University of Chicago, 1903-04; Ph. D., *ibid.*, 1904.

IRENE BAKER GUSTAFSON, Instructor in English.
A. B., University of Michigan, 1900.

ANDREW A. GOUR, Instructor in Physical Culture.
Graduate of Posse School of Physical Culture, Boston.

ABIGAIL FLORENCE WILLIAMS, Instructor in English.
B. L., Northwestern University, 1901; M. L., *ibid.*, 1902; Instructor in English, Joliet High School, 1902-03; Professor of English Literature, Missouri Valley College, 1903-04.

MARY KNOWLES WOODLE, Instructor in English.
Graduate of Kirkland School for Women, Chicago, 1898; Graduate of Chicago Normal School, 1899; Cadet in Chicago Normal School, 1899-1900; Teacher in Andrew Jackson School, Chicago, 1900-03.

HORACE B. MCCABE, Instructor in Mechanical Drawing and Machine Shop Work.
Student in Colorado Agricultural College, 1891-92; Apprentice and Toolmaker, 1892-99; Draftsman with Parish & Bingham Co., 1899-1900; Instrument Maker with William Gaertner & Co., 1900-01; Machine Shop Foreman with Submerged Electric Motor Co., 1901-04.

Assistants and Other Officers

ANNA AMACKER, Sewing.
ALEXANDER D. BAILEY, Mechanical Drawing.
HERBERT A. BREYFOGLE, A. B., Latin.
AGNES BROWN, Cookery.
FRANK W. CADY, English and Mathematics.
ALICE DELAGNEAU, French.
MINNIE DUNWELL, German.
ORRA M. S. FOOTE, Sewing.
H. WALTER FORSTER, Mechanical Drawing.
JOHN GRZYBOWSKI, Mechanical Drawing.
FREDERICK L. HAVENS, Machine Work.
OCIE M. HAZZARD, Cookery.
NOBLE S. HEANEY, A. B., Latin.
CHARLES F. HENNING, Mechanical Drawing.
MARION HEYWOOD, Physical Culture.
CHARLES P. HULBIRD, Mechanician and Curator.
JAY S. JACKSON, English.
J. M. JESSUP, Electricity.
MARY KANE, Physical Culture.
WILLIAM J. KEARNEY, B. S., Engineer.
ROY KEESE, Mechanical Drawing.
L. E. KING, B. S., Electricity.
WILLIAM M. KINNEY, Wood Work.
A. P. LAUGHLIN, Wood Work.
F. HOWARD LANE, Electricity.
EMILY MCCURDY, Cookery.
LYDIA MOJONNIER, Accountant and Stenographer.

HAROLD H. MORGAN, Engineering Mathematics.
EDWIN G. NOURSE, English.
INA K. PITNER, Millinery.
HAROLD ROBBINS, Machine Sketching.
IDA SERVEN, Public Speaking.
J. P. SHAW, Accounting.
JOHN C. SOUTH, M. S., Mathematics.
DON FERNANDO STAUD Y XIMENES, M. E., Spanish.
HELEN A. SULLIVAN, English.
FRANCES TALCOTT, Librarian.
ELLEN TORELLE, Ph. D., History.
JOHN A. TUCK, Ph. B., Mathematics.
WILLIAM A. WALTERS, English.
OTTO WICHERSKI, English.
E. C. WINTERS, Accounting and Penmanship.

Organization and Equipment.

Historical Sketch.

The Lewis Institute owes its existence to the late Allen C. Lewis, who, by his will, which was admitted to record November 1, 1877, left a large part of his estate for the support of the Institute, and provided for its organization. Articles of incorporation for the Institute thus projected were granted by the Secretary of the State of Illinois, July 9, 1895.

James M. Adsit, Henry F. Lewis, and Hugh A. White were named in the will as the first trustees of the estate, the estimated value of which in 1877 was five hundred and fifty thousand dollars. Credit is due to these trustees, and especially to Hugh A. White, for such efficient management that the estate amounted, when turned over to the trustees of the Lewis Institute, November 21, 1895, to one million six hundred thousand dollars.

John A. Roche, Christian C. Kohlsaat, and John McLaren, under whom the Institute was incorporated, constituted the board of trustees from May 28, 1894, until the completion of the first buildings. The sites previously chosen having proved unsuitable, the trustees selected and purchased, at an expense of one hundred and sixty-nine thousand dollars, the principal portion of the block extending from Monroe street to Madison, between Winchester avenue and Robey street. This site is centrally located in the West Division of Chicago, and is easily accessible from all parts of the city by means of several lines of surface cars, and the Lake street and the Metropolitan elevated roads.

The erection of the first buildings was commenced in May, 1895. The Institute was opened in September, 1896.

Organization.

The Institute consists of a SCHOOL OF ARTS and a SCHOOL OF ENGINEERING.

The School of Arts comprises the instruction which is given in English, history, mathematics, physiography, physics, chemistry, biology, philosophy, Latin, Greek, German, French, Spanish, domestic economy, and freehand drawing. The course offered in these subjects are outlined on pages 32-54.

The School of Engineering offers instruction in mechanical and electrical engineering to students who wish to become professional engineers. The courses of instruction in wood, pattern, foundry, forge, and machine shops, together with those in drawing, design, sketching, applied mathematics, electrical and mechanical engineering laboratories, are outlined under Engineering, pages 58 to 63. The aim is to present these subjects so that the student will become familiar with the underlying principles and acquire intelligence and skill in manipulation. Persons who intend to follow a trade allied to engineering may pursue such special courses as are recommended after consultation with the Director. The instruction given at night furnishes similar opportunities to those who are occupied during the day.

The Buildings and Their Appointments.

The buildings are fire-proof structures of brick, sandstone, terra-cotta, and steel, and have been erected at a cost of four hundred thousand dollars for buildings, and one hundred and fifty thousand dollars for equipment.

The Arts Building, at the corner of Madison and Robey streets, is a six-story structure; the Engineering Building, on Robey street, has seven stories; and the Gymnasium, in the rear of the other buildings, has two stories. A high, well-lighted basement occupies the entire space covered by all the buildings and the alleys which separate them.

Both the Engineering and the Arts Buildings are supplied with elevators and the most approved appliances for heating

and ventilation, and are equipped with all apparatus needed for the successful accomplishment of the work that has been undertaken.

The Library.

The library consists of twelve thousand volumes, selected with immediate reference to the needs of each department. It is essentially a working library, containing all necessary reference works, together with representative books in the various sections of history, biography, literature, fine arts, engineering, mathematics, philology, and sociology. There are special libraries connected with the class-rooms in physics and chemistry. One hundred and sixty-three periodicals are currently received.

Throughout the school year the library is open from eight a. m. to five-thirty p. m.; during the session of the night school the hour for closing is nine-thirty p. m. The students at all times have free access to the shelves. Library assistants serve in turn at the reference desk and assist in making the students familiar with the arrangement of the books and the use of the dictionary catalog. It has been attempted to make the catalog a clear, simple guide to the resources of the library and to keep it free from confusing technicalities. The Dewey system of classification is used, with Cutter book numbers.

The Laboratories.

The *Geographical and Geological Laboratory* equipment includes the following: Topographical atlas sheets of the United States to the number of several hundred; United States Coast and Geodetic Survey charts and Geological folios; Mississippi and Missouri river charts; pilot charts of the Atlantic and Pacific oceans; weather maps and charts; relief globe of the earth; relief maps of the United States and of selected localities; collections of common rocks and minerals; several hundred lantern slides; tables and facilities for moulding topographic features; books of reference.

The rooms assigned to the *Department of Chemistry* occupy the west end of the fifth floor. They include lecture-room, departmental library, general laboratory, analytical laboratory, organic laboratory, balance room, and store room. The lecture room has a seating capacity of three hundred. The laboratories are furnished with convenient desks, supplied with water and gas. In each laboratory there is a liberal number of hoods, each of which is exhausted by an electric fan. The store room is supplied with all the apparatus needed for the courses as outlined. It also contains a full list of chemicals, both organic and inorganic, including a set of specimens of the most important naturally occurring compounds of each element. The balance room is provided with Sartorius analytical balances. The department library includes the best English, German, and French reference works, and the current English and American periodicals.

The east end of the fifth and sixth floors is used for the work in *Domestic Economy.* It contains a lunch room and a kitchen, a cooking laboratory, and recitation rooms.

The *Lunch Room* is large, airy, and in every way attractive. Lunch is prepared in the Institute kitchen, under the direction of the instructor in domestic economy. The bill of fare always includes soup, milk, chocolate, sandwiches, fruit, and a warm dish, such as meat-pie or baked beans, and usually a salad and a light dessert. Students who bring their lunches from home are permitted to use the lunch room tables. They may, if they desire, suppplement their lunches with articles from the bill of fare.

Next to the lunch room is the *Cooking Laboratory.* This has accommodations for sixteen students, with every facility for individual work.

The work in *Sewing and Millinery* is carried on in ample quarters in the sixth story, with overhead light.

The *Department of Physics* has an especially equipped lecture room with stereopticon, hydraulic lift, pressure gauges, vacuum gauges, electrical instruments, and recording hygrometer. The lecture table is provided with water, compressed

air, steam, and Chapman pump for producing vacuum. The rooms for the use of the department are: general physics laboratory, departmental library, apparatus and preparation room, photometric rooms, private workroom, advanced laboratory, electrical measurements room, and photographic rooms. In the advanced physics laboratory each table is provided with four slate-lined fuse boxes, from which different currents for use in testing may be obtained. The reference library is supplied with a large assortment of books on the subjects of Physics and Electricity, and the leading periodicals of this country and Europe. The photometric room is equipped with a Lummer-Brodhun photometer and standard lamps.

The workroom is in charge of a competent mechanician, and is equipped with an eight-inch Rivett precision lathe, with attachments for milling, grinding, and screw-cutting, a Walker grinder, and numerous hand tools.

The laboratories are fully equipped with all apparatus for quantitative work in general physics and electricity. Some of the more recent additions to the outfit for work in light are the following: A Schmidt and Haensch spectrometer, a Schmidt and Haensch polariscope, a Michelson interferometer, and a Newton lecture-room polariscope.

The electrical equipment consists of standards of resistance, capacity, self-induction, and electromotive force; resistance boxes, bridges, galvanometers, and electrometers from Nalder Brothers & Co., Elliott Brothers, and Hartmann & Braun; also dynamometers and Westen & Whitney voltmeters, and ammeters of various types and ranges. A twelve-inch induction coil furnishes an important part of the equipment. Specially designed switch-boards are located in the general physics laboratory and in the advanced laboratory. The latter is equipped with a Weston voltmeter, a Weston ammeter, and an automatic circuit breaker.

The apparatus in the engineering laboratories is also available for use in the department of physics.

The Shops and Engineering Laboratories.

The *Foundry,* on the sixth floor of the engineering building, is well lighted from skylights in the roof and windows in the side and end.

The moulding floor is made of cedar block placed on end, and the floor around cupola and furnaces is of brick. There are places for sixteen students, each place having a moulding floor and a bench, and each bench an equipment of shovel, riddles, rammers, bellows, trowels, slicks, lifters, strikes, gate cutters, etc.

The remaining equipment consists of a core room, having a core bench with bins for the different materials used; a core oven 4 feet wide by 6 feet long by 6 feet high, which can be fired either by gas or coke, and rack for core boxes and stock cores; two cupolas, one 16 inches inside the lining, hung from ceiling on trunnions, the other 24 inches inside the lining, supported on 4 posts; two brass furnaces; a 24 inch by 38 inch rattler, and an 18 inch cupola fan. The machinery is driven by a 5 horse-power electric motor. A one ton 16 foot electric crane runs the entire length of the shop, and commands the floor used for large work. A track suspended below the crane track runs from the cupola to all the mouldiing floors, and is used to carry a large ladle of iron from which small ladles are filled when pouring. A class room and an office open off the foundry. In the center of the building above the sixth floor is a room used for pattern storage.

The *Pattern Shop* on the fifth floor is equipped with eight double benches, each side having a vise, a general closet, and four locked drawers. The closets in the benches contain the general tools used by the students in common, and the drawers contain sets of edged tools for the use of the individual student. Special tools and supplies are kept in the tool room. The machines in the pattern shop are one 24 inch 12 feet, and three 16 inch 6 feet, overhanging spindle lathes; two 12 inch 5 feet, and two 11 inch 4½ feet lathes; one 26 inch surface planer; one universal circular cut off and ripsaw; one 36 inch

band saw; one grindstone; one emery tool grinder, and one universal trimmer. A case of individual lockers is provided in which students keep small work while it is in process of construction, and a special room is provided for keeping larger work. The band and circular saws and the planer are driven by individual motors. The lathes are driven from two short line shafts, each of which is driven by a motor. A class room and an office open off the shop.

The *Elementary Wood Shop* is equipped with nine double benches similar to those in the pattern shop, and has also four 10 inch by 3½ feet, and fourteen 11 inch by 3½ feet, lathes driven by a 10 horse-power electric motor.

The *Machine Shop* is on the fourth floor and occupies two separate rooms. The shop at the north end of the building is for elementary machine work, and the south shop is for advanced students. Between the two shops, and communicating with both is the tool and stock room, where all small tools and supplies are kept.

The equipment of the elementary shop consists of one 12 inch 5 foot engine lathe, with draw chucks and taper attachment; one 4 inch 6 foot, and one 15 inch 6 foot engine lathe with taper attachment and compound rest; two 14 inch 6 foot, and one 15 inch 6 foot plain engine lathe; two 12 inch 4 foot speed lathes; one 16 inch crank shaper; one double-wet emery tool grinder; one 18 inch drill press, and sixteen vises placed on a bench running along two sides of the shop. Near the entrance is placed a case of small lockers in which the students keep their work and individual tools. The machines in this room are driven by a 10 horse-power electric motor, attached to the ceiling.

The *Machine Shop* for advanced work is equipped with one 18 inch 12 foot engine lathe with compound rest; one 16 inch 8 foot, and one 15 inch 6 foot engine lathe, with taper attachments; one 14 inch 6 foot tool maker's lathe with compound rest, draw chucks, and taper and backing off attachment; one 12 inch 4 foot speed lathe; one No. 3 screw machine, with wire feed; one No. 2 universal miller; one No. 3 universal

miller; one No. 2 universal grinder; one 26 inch rack shaper; one 24 inch by 24 inch by 6 foot planer; one 24 inch back geared drill press; one 13 inch sensitive drill press; one wet emery tool grinder; one universal cutting grinder; one circular cut-off saw; eight vises placed on wood benches along the walls on two sides of the shop; and four vises on iron benches placed on the erecting floor and among the machines. All the tools in this shop are driven by independent direct current motors, with a speed changing device placed on each machine. In the tool room are kept the general tools and cutter holders belonging to the machines, all the small tools, scales, standard gaugers, measuring instruments, supplies, and general stock used in the work of the shops. The tool room is in charge of an attendant who, by means of the check system, issues tools to students as they are needed in the work. A 16 foot hand-power traveling crane, mounted in the center of the shop so that it can traverse the whole width of the building, provides for the handling of heavy work and parts of the machines and tools. A class room and an office open off the shop.

The *Forge Shop* is in the basement of the engineering building, but is well supplied with light during the day by windows on three sides, and at night by arc lights. The equipment consists of sixteen ordinary forges; one large forge for ordinary work; one gas tempering forge; one brazing forge; one 250 pound, one 200 pound, and fifteen 150 pound anvils; one 200 pound steam hammer; the hand hammers, sledges, fullers, swages, punches, chisels, tongs, and similar tools necessary for ordinary forge work; one hardening tank with pipe for circulating water; and one water cooled oil hardening tank. A 12 foot hand-power traveling crane handles large work for the steam hammer, large forges, heatting and annealing furnaces, and the hardening tanks. The smoke from the forges is taken away through down draft hoods by a 60 inch steel exhaust fan, and the blast is supplied by a 24 inch blower, both being driven by a 15 horse-power motor. A post drill, a double emery grinder, and a blower

for the gas forge are driven from a separate motor. A stock room and a class room open off the shop.

The *Electrical Engineering Laboratory* is on the third floor of the engineering building. Its function is to supplement the work of lecture and class rooms in training students in the principles of electrical engineering. The apparatus is typical rather than special, and represents the most recent practice. The equipment includes one 33 K. W. direct current motor and one 23 H. P. direct current motor, used for driving line shafting; twelve direct current motors, 5 K. W. and smaller; one 35 light arc dynamo; one 5 K. W. two phase alternator; one 6 K. W. two phase rotary converter; one 5 K. W. two and three phase rotary converter; one 7½ K. W. double current generator, two and three phase and direct current; one 2½ K. W. rotary converter for electrolytic work and welding, converting from 110 volts direct current to 8 volts direct current and 6 volts three phase alternating current; two 2 H. P. single phase induction motors; one 3 H. P. three phase induction motor; one 5 H. P. three phase variable speed induction motor with three phase secondary mounted on a cradle dynamometer, and available as an induction motor, generator, or regulator, as a three phase stationary transformer, or as a frequency changer; four 2½ K. W. transformers with 2 to 3 or 3 to 2 phase connections; four 5 K. W. transformers with a wide range of voltages; one 7½ K. W. welding transformer; one 5 K. W. 30,000 volt testing transformer with instruments; one constant current series arc transformer with lamps; one constant current arc regulator; apparatus for transforming from constant pressure to constant current; one condenser compensator; one 10 K. W. integrating polyphase wattmeter; artificial transmission lines, a large number of indicating instruments, resistances, reactances, etc.

The *Mechanical Laboratory* is located on the second floor and covers a floor space of fifty by sixty feet. The apparatus in this laboratory is concerned largely with mechanical transmission, efficiencies, and testing of instruments. In the equip-

ment are various forms of transmission and absorption dynamometers, belt testing machine, Reeves variable speed counter shaft, steam engine indicator spring tester, fifty foot mercury column, deadweight oil gauge testers, lubricating oil testers, Chetalier pyrometer, smoke analysis apparatus, various forms of coal calorimeters, standard weights and thermometers. The motive power of this room is supplied by a 20 H. P. electric motor hung on a cradle dynamometer.

The *Strength of Materials Laboratory* occupies one-half of the first floor of the engineering building. It has an area of 3,000 square feet. The laboratory has equipment for testing steel and other metals, timber, cement, etc. The principal machines installed are: A 200,000 pound Olson, a 40,000 pound Riehle, a 1¼ inch by 4 foot Olsen torsion, a dynamograph for finding the machinability of materials, a Keep dead load, and a Keep impact for cast iron, and a 2,000 pound Fairbank cement tester.

The *Steam Laboratory* is in the northwest corner of the basement of the main building, and covers about 5,000 feet of floor space. It is fitted for a great variety of work in compressed air, ammonia, and steam. Included in its equipment are a 30 H. P. return flue boiler, arranged for natural or induced draft; a vertical pipe smoke economizer; a 7 by 12 straight line engine, capable of attachment to an Alden water brake, as well as the ordinary forms of brake; an experimental engine, arranged to take various forms of valve, easily changeable; a gas engine, capable of many adjustments and arranged with gas and air meters; a surface condenser with necessary weighing tanks; an air and ammonia compressor in connection with a half-ton refrigerating system; air tanks capable of withstanding 1,200 pounds pressure; five forms of injectors, arranged for complete mechanical and heat efficiency tests; various pumps, calorimeters, indicators, etc.

The *Hydraulic Laboratory*, with a floor space of about 3,000 square feet, is located in the north end of the basement, engineering building. It is equipped with weighing, pressure, and weir tanks, rotary and reciprocating pumps, water wheel, and

water motor. The arrangement of connections makes possible a large number of combinations.

The Drawing Rooms.

The rooms for drawing and design are in the engineering building, four on the sixth floor, two on the fifth, and one on the fourth floor. They aggregate about five thousand square feet of floor space and are amply lighted and furnished. Their proximity to the foundry, pattern, and machine shops makes it possible to co-ordinate, to an unusual degree, the design and the constructive branches.

The blue-print room is on the mezzanine floor above the sixth, and is approached through a drawing room on the sixth floor. It is equipped with a 40 by 52 inch curved glass blue-print machine, tracing files, blue-print baths, etc.

Tuition.

The rates of tuition for day students are ten dollars a quarter for one course of instruction, and twenty dollars for two or more courses.

The rates for night students are five dollars for a term of ten weeks for one course of instruction, two evenings a week, and ten dollars for two courses, four evenings a week.

Fees.

Day students are required to pay a registration fee of five dollars.

Both day and night students, who take one or more shop or laboratory courses in the departments of physics, chemistry, and engineering, are required to pay a fee of five dollars a quarter.

Students in chemistry deposit two dollars each to cover breakage. If the charges do not amount to two dollars, the excess is returned to the student.

Student Organizations.

There are numerous student organizations in the Institute,

but all include some member or members of the faculty who act as sponsors for them. In addition to the social life thus provided, these societies afford chances for improvement in music, dramatic art, the study of classical antiquity, the conversational use of foreign languages, and special topics in engineering.

Scholarships.

Three scholarships have been established under the will of the late Mrs. Hugh A. White. Mr. John McLaren was named in the will to assign these scholarships.

Three additional scholarships are assigned by the Institute for excellence in public speaking.

Income and Expenses.

The income derived from the endowment and all receipts from tuition and other sources are used for the maintenance and advancement of the work of the Institute.

The School of Arts.

Admission.

Each candidate for admission is required to furnish a testimonial of honorable dismissal from the school last attended. He must also refer to two persons, preferably his teachers or employers, from whom information about him may be obtained.

Candidates from Chicago grammar schools and other schools of equal rank, who have completed satisfactorily the work of the eighth grade, may be admitted without examination, upon recommendation of the principal of the school from which they come. Application for admission should be made in person, upon one of the days set for the regular entrance examination.

Candidates for admission other than those mentioned above are examined as follows:

1. English. The candidate will be expected to write, neatly and legibly, a few paragraphs on one of several subjects assigned by the examiner. These subjects will require no special or "school" knowledge, but will draw upon the student's past experience of ordinary life. Because this is the fact, the candidate will be expected to spell correctly all the words he uses in his paper. He is advised to use no word concerning the spelling of which he is in doubt.

The candidate will further be expected to answer questions of average difficulty concerning English grammar, as treated in such a book as Kittredge and Arnold's The Mother Tongue, Part II, or Lewis's Applied English Grammar. Ability to understand the relations of the parts of a complex sentence to

each other is a good indication of the degree of maturity required in the successful applicant.

2. Arithmetic. The examples set will be practical problems in common and decimal fractions, common measures, and percentage as it is applied in ordinary business. Mental arithmetic from dictation will be a part of the examination, and both the facility and the accuracy of the candidate will be tested.

3 History of the United States. Pupils will be expected to know something of the settlement of North America; the Revolutionary War, the War of 1812, and the Civil War; the inventions that have favored trade and manufactures; compromises and legislation concerning State Rights and Slavery. Some knowledge will be required concerning the biography of famous Americans and concerning questions of the day.

4. Geography. The examinations will be given in the form of outline maps on which natural features, lines of communication, and other geographical facts are to be located. The pupil should have an accurate knowledge (1) of the location of the more important physical features (mountains, plains, seas, rivers, etc.); (2) of the more important political subdivisions (countries, states, and chief cities); (3) of the important natural resources; and (4) of commercial geography. In all these respects emphasis should be placed on the geography of North America and Europe.

Candidates for advanced standing are admitted upon presentation of certificates from Chicago high schools and other schools of equal rank, and are assigned to classes upon the basis of these certificates. Any such standing is regarded as probationary until confirmed by examination. The examinations are held during the first week of each school year, and take the form of recitations, oral and written, which determine the candidate's fitness to continue the work in the classes to which he has been assigned. The Institute reserves the right to revise such standing if it should appear that the student needs more time for preparation in any given subject.

Assignment of Studies.

A student on entering the Institute is assigned to such studies as seem to be best suited to his individual aims and needs as far as these can be determined from personal consultation and from an examination of the record of work done elsewhere. This assignment is made for a term of three months and is revised each quarter in the light of the work of the preceding quarter. The progress a student makes depends on his own ability and application, and is quite independent of what others are doing.

Courses of Instruction and Credits.

Unless otherwise specified a course of instruction continues for twelve weeks with fifty-minute periods of class work, five days in the week.

The unit of credit is sixty hours.

The satisfactory completion of a course of instruction which requires 120 hours, counting time of preparation and recitation, or time devoted to laboratory, drawing, or shop work, entitles the student to two credits; 180 hours, to three credits.

The number of periods of class work required daily and the number of credits assigned to each course of instruction are shown in the Suggestive Curricula.

In the Announcements, pages 32-63, the figures in parenthesis indicates the number of credits given for each course.

The Academic Certificate.

To obtain the Academic Certificate the student must receive 90 credits, of which 42 are prescribed as follows: English 18, algebra and geometry 12, foreign language 12. The remaining 48 credits are not elected by students, but are arranged for and planned with them with the view of helping them to make the best use of their time and talents and opportunities.

The Title of Associate in Arts.

To obtain the Title of Associate in Arts the student must

secure 144 credits, of which 69 are prescribed as follows: English 21, mathematics 18, foreign languages 18, history 6, physics or chemistry 6; leaving 75 credits to be selected according to the varying needs of different students.

Suggestive Curricula.

On pages 30 and 31 four Suggestive Curricula are outlined, which are designed to suggest to patrons and students some of the various combinations of studies that may be made, and the order in which they may most profitably be taken. The first curriculum puts the emphasis on science and modern languages. The second is a modification of the first, designed to meet the needs of young women who specialize in domestic economy. The third and fourth are made up of such courses of instruction as are commonly required for the bachelor's degree in colleges of liberal arts.

Special Courses of Instruction.

As a rule, students are expected to take up the work of some one of the curricula outlined below, in which such choice of studies is allowed as is calculated to meet their needs. There may be those, however, who will be obliged to confine their work to one or two subjects of study. This may be done when the circumstances seem to justify it, subject to such conditions as may be imposed by the Director.

Standings and Reports.

At the end of the quarter reports are sent to parents or guardians showing the standings of students in the courses of instruction pursued. These standings are based on daily work and quarterly examinations. The parents of students who are not doing satisfactory work are notified in the middle of the quarter, and their co-operation is secured, when possible, through personal interviews.

Attendance and Discipline.

Prompt and regular attendance is expected of all students.

When such attendance cannot be secured, and when it becomes apparent that the student is not profiting by his connection with the Institute, his parents or guardians will be given an opportunity of withdrawing him, and if he is not withdrawn within a reasonable time, he will be dismissed.

Time Requirement.

The time required for the completion of the work of any one of the curricula will vary with different students, according to their ability, health, application, and time for study. Students whose school work has been in no way interrupted should be prepared for admission to the Institute at the age of fourteen years, and if able to give the working hours of the day to their school duties, they should complete the studies of any one of the curricula in six years.

Half-Day and Evening Courses.

Many boys and girls are obliged to leave school in order to take care of themselves and those dependent upon them, at a time when their more fortunate associates enter upon such courses of instruction as are herein outlined. Such as can attend the Institute but half of each day may, by prolonging the time requirement, complete the work of some one group of studies, or at least perfect themselves in one or more subjects. Provision has also been made for such instruction at night as enables young men and women who are employed during the entire day to continue their education along those lines which will be of the most service to them in the work in which they are engaged.

1. SCIENCE AND MODERN LANGUAGES.

Year.	Autumn Quarter.	Course No.	No. of Credits.	Hours in Class.	Winter Quarter.	Course No.	No. of Credits.	Hours in Class.	Spring Quarter.	Course No.	No. of Credits.	Hours in Class.
First.	English	1	2	1	English	2	2	1	English	3	2	1
	Mathematics	1	2	2	Mathematics	2	2	1	Mathematics	3	2	2
	Latin	1	2	1	Latin	2	2	2	Latin	3	2	1
	Physiography or	2	2	2	Physiography or	1	2	2	Physiography or	2	2	2
	Shopwork or	2	2	2	Shopwork or	2	2	2	Drawing or	2	2	2
	Drawing	1	2	2	Domestic Economy	1	2	2	Domestic Economy	2	2	2
	Total		8	6			8	6			8	6
Second.	English	4	2	1	English	5	2	1	English	6	2	1
	Mathematics	4	2	1	Mathematics	5	2	1	Mathematics	6	2	1
	Latin	4	2	1	Latin	5	2	1	Latin	6	2	1
	History	1	2	1	History	2	2	1	History	3	2	1
	Total		8	4			8	4			8	4
Third.	Mathematics	12	3	1	History	5	3	1	History	6	3	1
	Physics	1	3	2	Physics	2	3	2	Physics	3	3	2
	German	1½	3	1	German	3	3	1	German	4½	3	1
	Total		9	4			9	4			9	4
Fo'rth	English	7	3	1	English	8	3	1	Mathematics	10	3	1
	Chemistry	1	3	3	Chemistry	2	3	3	Chemistry	3	3	3
	German	7	3	1	German	8	3	1	German	9	3	1
	Total		9	5			9	5			9	5
Fifth.	English	9	3	1	English	10	3	1	English	11	3	1
	Chemistry	4	3	3	Chemistry	5	3	3	Chemistry	6	3	3
	French	1½	3	1	French	3	3	1	French	4½	3	1
	Total		9	5			9	5			9	5
Sixth.	History	7	3	1	History	8	3	1	History	9	3	1
	Biology	1	3	2	Biology	2	3	2	Biology	3	3	2
	French	7	3	1	French	8	3	1	French	9	3	1
	Total		9	4			9	4			9	4

2. *DOMESTIC ECONOMY

Fifth.	Biology	1	3	2	Biology	2	3	2	Biology	3	3	2
	Domestic Economy	7	3	2	Domestic Economy	8	3	2	Domestic Economy	9	3	2
	Domestic Economy	D	2	2	Domestic Economy	E	2	2	Domestic Economy	F	2	2
	Total		8	6			8	6			8	6
Sixth.	English	9	3	1	English	10	3	1	English	11	3	1
	Chemistry	4	3	3	Chemistry	7	3	3	Chemistry	6	3	3
	Domestic Economy	10	3	2	Domestic Economy	11	3	2	Domestic Economy	12	3	2
	Total		9	6			9	6			9	6

*For first four years, see Science and Modern Languages.

3. *LATIN AND MODERN LANGUAGES.

Autumn Quarter.	Course No.	No. of Credits.	Hours in Class.	Winter Quarter.	Course No.	No. of Credits.	Hours in Class	Spring Quarter.	Course No.	No. of Credits.	Hours in Class.
athematics	12	3	1	History	5	3	1	History	6	3	1
atin	7	3	1	Latin	8	3	1	Latin	9	3	1
rench	1½	3	1	French	3	3	1	French	4½	3	1
Total	....	9	3		..	9	3		....	9	3
nglish	7	3	1	English	8	3	1	Mathematics	10	3	1
atin	10	3	1	Latin	11	5	1	Latin	12	3	1
rench	7	3	1	French	8	3	1	French	9	3	1
Total	....	9	3		..	9	3		....	9	3
nglish	9	3	1	English	10	3	1	Mathematics	14	3	1
atin	13	3	1	Mathematics	13	3	1	Latin	14	3	1
erman	1½	3	1	German	3	3	1	German	4½	3	1
Total	....	9	3		..	9	3		....	9	3
nglish	11	3	1	Latin	15	3	1	English	12	3	1
hysics	1	3	2	Physics	2	3	2	Physics	3	3	2
erman	7	3	1	German	8	3	1	German	9	3	1
Total	....	9	4		..	9	4		....	9	4

4. *LATIN, GREEK, AND MODERN LANGUAGES.

[athematics	12	3	1	History	5	3	1	History	6	3	1
atin	7	3	1	Latin	8	3	1	Latin	9	3	1
rench or	1½	3	1	French or	3	3	1	French or	4½	3	1
erman	1½	3	1	German	3	3	1	German	4½	3	1
Total	....	9	3		..	9	3		....	9	3
nglish	7	3	1	English	8	3	1	Mathematics	10	3	1
atin	10	3	1	Latin	11	3	1	Latin	12	3	1
rench or	7	3	1	French or	8	3	1	French or	9	3	1
erman	7	3	1	German	8	3	1	German	9	3	1
Total	....	9	3		..	9	3		....	9	3
nglish	9	3	1	English	10	3	1	Mathematics	14	3	1
atin	13	3	1	Mathematics	12	3	1	Latin	14	3	1
reek	1	3	1	Greek	2	3	1	Greek	3	3	1
Total	....	9	3		..	9	3		....	9	3
nglish	11	3	1	Latin	15	3	1	English	12	3	1
hysics	1	3	2	Physics	2	3	2	Physics	3	3	2
reek	4	3	1	Greek	5	3	1	Greek	6	3	1
Total	....	9	4		..	9	4		....	9	4

* For first and second years, see Science and Modern Languages.

Courses of Instruction in the School of Arts.

The figure in parenthesis indicates the number of credits that are given for the course. For definition of credit and course see page 27.

English.

Instruction is offered in English grammar, composition, oral reading, public speaking, and literature.

The historical grammar of English is not presented formally at any point in the course, but daily drill is given in matters of correct conversational usage.

In the teaching of composition the aim is to develop in the student the largest possible amount of practical power—the ability to present his own thoughts in clear and orderly fashion.

Throughout the course practice is given in oral reading. No attempt is made to cultivate the elocutionary graces. Simple and intelligent reading is found to be an end sufficiently difficult to attain.

Throughout the course practice is given in public speaking The pupil is expected to face the class and speak to it with simplicity and directness. He is urged to choose topics in connection with which he can appeal to his audience for definite action.

In most of the literary courses, masterpieces are chosen and presented with reference to the ascertained interests and ideals of the student. In courses 7 and 8 this principle is subordinated to the "uniform college entrance requirements."

In courses 1-6 the regular text-books at present used are as follows: Lewis, First Manual of Composition, revised edition; Lewis, Introduction to the Study of Literature; Moulton, Old Testament Stories; Shakspere, The Merchant of Venice, edited by Miss Underwood; and numbers 21, 40, 27, 37, 133 in the Riverside Literature Series, being selections from Franklin, Hawthorne, Thoreau, and Warner, with Schurz's Life of Lincoln. These books are referred to below by abbreviations.

1. (2) The chief object of Course 1 is correctness in speaking

and writing English. Average sections cover First Manual, Chap. I., and Moulton. Special sections omit Moulton and receive more drill in correctness.

2. (2) Average sections cover First Manual, Chap. II., and Introduction, I.-V. Special sections take fewer chapters of literature and more drill in correctness.

3. (2) Average sections cover First Manual, III., and Introduction, VI.-X. Special sections abbreviate Introduction.

4. (2) Average sections cover First Manual, IV., Franklin (21), Hawthorne (40), and Thoreau (27). Special sections omit 21 or 27, or both.

5. (2) Average sections cover First Manual, V., Schurz's Lincoln (133), and Warner (37). Special sections omit 37.

6. (2) Average sections cover First Manual, VI., and Merchant of Venice. Special sections omit Merchant of Venice.

1-6. COMPOSITION. Students who for whatever reason have not attained the degree of correctness required for entrance to course 7 are assigned to course 1-6, which amounts to a review of all preceding work in writing and speaking English.

7. (3) LITERATURE AND COMPOSITION. The following masterpieces will be studied in 1905-1906: Shakspere's *Julius Cæsar;* Milton's *L'Allegro, Il Penseroso, Comus, and Lycidas;* Burke's *Speech on Conciliation with the American Colonies;* Macaulay's *Essay on Addison* and *Essay on Johnson.*

8. (3) LITERATURE AND COMPOSITION. The following masterpieces will be read in 1905-1906; Shakspere's *Merchant of Venice* and *Macbeth;* Addison's *Sir Roger de Coverley Papers;* Irving's *Life of Goldsmith;* Coleridge's *The Ancient Mariner;* Scott's *Ivanhoe* and *Lady of the Lake;* Tennyson's *Gareth and Lynette, Lancelot and Elaine,* and *The Passing of Arthur;* Lowell's *The Vision of Sir Launfal;* George Eliot's *Silas Marner.*

1-8. COMPOSITION. Students who for whatever reason have not attained the degree of facility and correctness required for entrance to course 9 are assigned to course 1-8. The work is based on Lewis's Second Manual of Composition. All students are advised to take this course; a large number are required to take it.

9. (3) RHETORIC AND ENGLISH COMPOSITION. This course lays stress upon the structure of the whole composition, the paragraph, and the sentence. It affords practice in writing by twelve themes, illustrating the following species: Narration, description, translation, summary, exposition, argument.

10. (3) ENGLISH LITERATURE AND COMPOSITION. This course is intended to serve as an introduction to the theory of literature; but on the principle that sane criticism presupposes an intimate knowl-

edge of facts, a considerable body of English poetry is required to be committed to memory. Almost daily written work is required, in the form of brief criticisms and interpretations.

11. (3) ENGLISH COMPOSITION. The object of this course is threefold: To give a more technical theory of composition than that of course 9; to afford some practice in the construction of long themes, and to secure fluency by daily themes illustrating many types. Much personal consultation is required.

12. (3) SHAKSPERE. Dowden's Shakspere Primer and the following plays: *Romeo and Juliet, Henry IV. (Part I.), Twelfth Night, Hamlet, King Lear, Antony and Cleopatra, Coriolanus, The Winter's Tale, The Tempest.*

13. (3) THE ENGLISH ESSAY. A rapid survey is attempted of the history of the essay as an exponent of life and thought, particularly that of the present century. The authors especially studied are Hazlitt, Lamb, Landor, Newman, Carlyle, Emerson, Ruskin, Arnold, Stevenson.

14. PUBLIC SPEAKING. In connection with courses 9-11 a total of fifty short speeches is required of every student, over and above the regular work of these courses.

15. VOICE CULTURE. The aims of this course are three: To improve the health of students by proper training of the voice and the respiratory organs; to supplement the work in public speaking; and to correct such faults of address as hinder success in practical life.

History.

The work in history, as outlined below, is designed to secure two results: First, a knowledge of the important facts of history; and second, the discipline and training that come from the nature of the subject-matter studied. In all courses special attention is given to correct methods of study and to the orderly arrangement and causal nexus of historical facts as a basis for subsequent work.

The courses are arranged in four divisions, each division consisting of work for two quarters. The first three are Ancient history, English history, and the history of the United States with especial attention to the development of the national government. These three divisions afford an opportunity for two years' continuous work in history. The fourth division, comprising work for three quarters, has for its subject-matter the history of western Europe from the decadence of the Roman Empire to modern times, and is open to students who have completed the first and second or first and third of the previous divisions.

1. (2) HISTORY OF GREECE. In this course emphasis is placed

upon the period of Greek history from the Persian wars to the Roman conquest, and upon those features of Greek life and civilization which became the common property of the East and of Rome.

2. (2) HISTORY OF ROME. The early Republic, the territorial expansion and political development of Rome, the causes of the fall of the Republic, the earlier and later Empire form the subject-matter of the course. As far as possible, the time is divided equally between the Republic and the Empire.

3. (2) HISTORY OF ENGLAND. This course covers the period of English history to the accession of George III., with something of the history of the English colonies in America as a part of the expansion of the English nation.

4. (3) HISTORY OF ENGLAND. The subject-matter of this course is the history of England from the beginning of the Puritan movement to the present time. Special and intensive work is done upon selected topics and periods. Prerequisite: *Course 3.*

5. (3) HISTORY OF THE UNITED STATES. The course includes the colonial period; the progress of the colonies toward independence and union; the growth of the constitution, and the history of government under the constitution to the close of the Federalist administrations.

6. (3) History of the United States during the nineteenth century, with especial attention to the working of the constitution, the growth of political parties, and the industrial development of the country.

7. (3) EUROPE FROM THE FOURTH TO THE FOURTEENTH CENTURY. An outline course in general European history covering the period from the Council of Nicea to the removal of the Papacy to Avignon, treating in such detail as the time will permit the civilization and institutions peculiar to the period.

8. (3) EUROPE FROM THE FOURTEENTH TO THE EIGHTEENTH CENTURY. From the exile to Avignon to the close of the Seven Years' War. An outline study of the Renaissance, Reformation, Counter Reformation, Religious and Dynastic wars, and the struggle for colonial and commercial supremacy.

9. (3) EUROPE SINCE 1763. The effects of the American Revolution on Europe, attempts at reform, the French Revolution, Napoleon, the Holy Alliance, reforms in England, and the unity of Germany and Italy are some of the subjects that will be considered in the course.

10. (3) ELEMENTS OF POLITICAL SCIENCE. The course includes the study of the state in the abstract or the theories of the state; the state in the concrete or the actual working of government in some well known forms; government in the United States, begin-

ning with local forms, rural and municipal, and extending to the governments, state and national, with the inter-relations of the three.

11. ELEMENTS OF ECONOMICS. This course is designed to serve as an introduction to the further study of economic theory, and includes a discussion of the fundamental principles of Economics, definition and explanation of economic terms, processes, and conditions.

Courses 10 and 11 are offered in alternate years.

Mathematics.

A continuous and progressive course in pure mathematics for five years is offered, an outline of which is given below.

In the third year of the course, when students have some knowledge of elementary algebra, plane geometry, and trigonometry, ample opportunity is given to apply their knowledge in the study of physics; and in the sixth year students in engineering will have abundant use for their knowledge of mathematics obtained during the five years preceding.

Both the disciplinary and the practical purposes of mathematics are kept in view, and an earnest attempt is made to give due emphasis to each.

By repetition and reviews, it is believed, facility in the ready and masterly use of mathematics may be obtained, and the course, as a whole, has been planned with this purpose in view. Thus algebra is introduced in three distinct places in the course, geometry in three, trigonometry in two.

1. (2) ELEMENTARY ALGEBRA. Definitions and notations, positive and negative numbers, addition and substraction of algebraic expressions, parentheses, multiplication, and division, simple equations, factoring, highest common divisor, lowest common multiple.

2. (2) ELEMENTARY ALGEBRA, four days a week. Fractions, simple equations containing fractions, simple simultaneous equations, inequalities, involution and evolution. CONCRETE GEOMETRY one day a week.

3. (2) ELEMENTARY ALGEBRA, four days a week. Theory of exponents, radicals, quadratic equations, simultaneous equations involving quadratics, theory of quadratic equations, ratio and proportion. CONCRETE GEOMETRY one day a week.

4. (2) PLANE GEOMETRY. Elementary definitions, triangles, parallels, parallelograms, problems, loci of points. The geometric concepts should have been well fixed in mind during the two preceding

quarters. In this course the emphasis is to be placed on the logical demonstration of the theorems, and solutions of problems.

5. (2) PLANE GEOMETRY. Equality of polygons, circles, inscribed and circumscribed triangles and quadrilaterals, ratio and proportion. Especial emphasis is placed on original exercises.

6. (2) PLANE GEOMETRY, completed. The last four or five weeks of the quarter will be devoted to an elementary presentation of some of the most useful and fundamental facts of Plane Trigonometry.

6a. (3) SURVEYING. This course includes practical work with surveying instruments.

7. (2) ACCOUNTING. A study of common and decimal fractions, addition, percentage, discounts, commission, insurance, exchange bills, settlements, averaging accounts, and profit and loss. Special work in mental calculations.

8. (2) ACCOUNTING. Introduction and use of main books used in accounting, and application of principles learned in courses 7 to business transactions recorded in them. Exercises in opening and closing books, and practice in writing business papers.

9. (2) ACCOUNTING. The continued use of main books and the introduction of auxiliary books. A study of partnerships with methods of keeping accounts; adjusting profits and losses, making settlements and summarizing results. Business correspondence.

10. (3) ELEMENTARY ALGEBRA, *reviewed and completed.* A review and more thorough study of the fundamental operations. The solution of equations, the theory of exponents and surds. Theory of quadratic equations, indeterminate equations of the first degree, inequalities, ratio and proportion, progressions.

11. PLANE GEOMETRY, *reviewed,* with special emphasis on original problems and demonstrations. This course is not required of students who have completed courses 4, 5, and 6.

12. (3) SOLID GEOMETRY. Lines and planes in space, pencil of planes, polyhedral angles, polyhedra, parallelopipeds, prisms and pyramids, the cylinder, cone, and sphere, similar solids.

13. (3) ALGEBRA. Permutations and combinations, the binomial theorem, limiting values and vanishing fractions, convergency and divergency of series, undetermined coefficients, summation of series, introduction to the theory of equations.

14. (3) TRIGONOMETRY. Plane trigonometry, with an introduction to spherical trigonometry.

15. (3) PLANE ANALYTICAL GEOMETRY. Systems of co-ordinates; the equations and properties of the point, straight line, circle, parabola, ellipse, and hyperbola; the general equation of the second degree.

16. (3) DIFFERENTIAL CALCULUS. The elements of differential calculus.

17. (3) INTEGRAL CALCULUS. The elements of integral calculus.

18. (3) APPLIED CALCULUS. Applications of calculus to the integrations most frequently required in engineering subjects; intended to familiarize the student with the use of calculus as a practical instrument in mechanics, thermodynamics, and electricity.

Physiography.

In the courses in physiography and geology, lectures, recitations, and laboratory methods of work are used. The student is not confined to a single text-book, but is required to consult different authors. Maps, charts, and lantern views are freely used, and the students are encouraged to draw upon their store of mental pictures of familiar landscapes. So far as possible general principles are deduced from the facts thus brought out. Each pupil is required to give definite expression to his ideas through recitations, written descriptions, sketches, and diagrams, and by moulding in sand. Opportunities are afforded for field excursions under the guidance of the instructor. The aim of the instruction is the training of the powers of observation and reasoning, as well as the acquisition of useful information. To aid in the carrying out of this plan, the department possesses a large assortment of topographical maps, geological maps, coast and river survey charts, relief models, weather maps, lantern views, facilities for moulding the land forms, and the more important books of reference.

1. (2) PHYSIOGRAPHY. The motion of the earth and its relation to the sun and moon; elementary meteorology and climatology; distribution, movements, and deposits of the ocean.

2. (2) PHYSIOGRAPHY. The land: The modern doctrines of the origin and development of the surface features of the earth, the agencies involved, and the resulting forms are carefully studied and classified. A limited number of field excursions are made.

Course 2 may precede or follow course 1, according as the work is commenced in the autumn or winter.

4. (3) GENERAL GEOLOGY. The elementary features of dynamical, structural, and historical geology. Emphasis is placed upon the leading facts and principles of the science, and the more important events of geological history. Prerequisite: *Courses 1 and 2; Physics 1-3, and Chemistry 1-3, or their equivalent.*

Physics.

The work of the department consists of courses in general physics, together with special courses for students in engineering.

The design of the courses in general physics is to familiarize students with the principles of physics, and to cultivate correct methods of laboratory work, and also to serve as an introduction to applied mathematics. Attention is given to the preparation of records, to the manipulation of apparatus, and to the cultivation of the patience necessary to secure the best results.

The advanced courses may not be taken until the student has had such work in mathematics as will enable him to solve the problems that arise in lecture discussion and detailed laboratory practice. These courses are designed for students who intend to specialize in physical science or in engineering.

1. (3) GENERAL PHYSICS. Mechanics: A discussion and illustration of physical quantities and their measurement; simple types of motion; density, velocity, acceleration, force, work, power and efficiency, elasticity, and surface tension.

LABORATORY PHYSICS. Strictly quantitative, covering subjects named above.

2. (3) GENERAL PHYSICS. Heat: Thermometer, expansion, calorimetry, change of state, solutions, transference of heat, and theory of gases. Sound: Waves, sounds and their relations, sonorous bodies, compound tones and musical instruments. Light: Nature and propagation, reflection, refraction, theory of optical instruments, interference, dispersion, radiation and obsorption of light waves, color, and polarization.

LABORATORY PHYSICS. Quantitative work in heat, sound, and light.

3. (3) GENERAL PHYSICS. Electricity: Electrification, the electric field, electrostatic instruments, electric discharges, magnetism; the electric current, the electromagnetic field, relations between heat and electricity, units, telegraph and telephone, and electric waves.

LABORATORY PHYSICS. Quantitative measurements of current; electromotive force and resistance; testing batteries, incandescent lamps, arc lamps, motors and generators, and calibration of instruments.

4. (3) MECHANICS: Standard units; dimensions of dynamical units; properties of matter; measurements of precision in length, mass, and time; kinematics; statics; dynamics; special problems. Prerequisite: *Mathematics 14*.

5. (3) HEAT AND LIGHT. Calorimetry; radiation, conduction; thermodynamics; kinetic theory of gases; kinds of vibration; media of propagation; measurement of light waves; interference, reflection, and refraction of waves; photometry; special problems for advanced students. Prerequisite: *Mathematics 14*.

6. (3) ELECTRICAL MEASUREMENTS: Magnetism; magnetic units;

measurement of earth's field; electrostatics; electromagnetism; electromagnetic units; electrodynamics; measurement of resistance, current, electromotive force, quantity, capacity and temperature coefficients; calibration of instruments; electromagnetic theory of light. Prerequisite: *Mathematics 14.*

8. (3) PRIMARY AND SECONDARY BATTERIES: Historical development; modern theories; reactions; uses of different types; complete tests of primary and storage cells; care and maintenance. Prerequisite: *Course 6 and Chemistry 1.*

9. (3) ELECTRO-METTALURGY. Testing of primary and secondary batteries; electroplating; resistance of electrolytes; Faraday's laws; special investigations in electrolysis. Prerequisite: *Course 8 and Chemistry 1.*

10. THEORIES OF PHYSICS. Advanced course in heat, sound, or light, supplemented by research work in the laboratory. Prerequisite: *Course 8 and Mathematics 17.*

Chemistry.

The aim of the courses in chemistry is to give in the first place a knowledge of the fundamental principles of the science as a part of a general education; and afterwards a more extended knowledge of the subject and practice in manipulation to those who wish to devote themselves to pure or applied chemistry, or whose work along other lines will be made more efficient by a thorough training in chemistry. In the advanced work in chemistry a reading knowledge of German is assumed. Engineering students are encouraged to become familiar with the principles on which manufacturing processes or industrial methods are based, so that a firm foundation is laid for subsequent specialization in these directions. Opportunities are given for excursions to the plants of chemical industries located in and near Chicago.

All students taking courses in chemistry are required to deposit two dollars each quarter to cover charges for breakage. If the charges do not amount to the sum deposited, the excess is returned to the student.

The courses in elementary chemistry aim to develop the reasoning and observational powers of the student on scientific lines, and lead him by actual experiment to acquire a knowledge of the more important substances, possessing an economic interest, that are encountered in daily life. Most of the time is devoted to laboratory work, the recitations being chiefly utilized for systematizing the results thus obtained.

Lectures and recitations, four hours a week; laboratory work six hours a week.

A. (2) ELEMENTARY CHEMISTRY. General introduction; physical and chemical properties characteristic of the states of matter; chemical separation: water, air, etc.

B. (2) ELEMENTARY CHEMISTRY. Continuation of Course A. Study of some of the non-metals and their more important compounds.

C. (2) ELEMENTARY CHEMISTRY. Continuation of Course B. Completion of the non-metals. Introduction to some of the more important metals.

The courses in general chemistry give a knowledge of the natural occurrence, methods of preparation, properties and reactions of the important elements and compounds, explain these facts according to modern theories, point out their application to industrial processes. Instruction is given by means of lectures and recitations, illustrated by experiments whenever advantageous. In connection with each subject studied the student is required to read some standard work. The greater part of the laboratory work is qualitative, but it includes quantitave experiments involving both gravimetric and volumetric methods, and also a few inorganic preparations on a somewhat elaborate scale. Lectures and recitations, five hours a week; laboratory work, ten hours a week. Reference book, Newth's Inorganic Chemistry. Prerequisite: *Courses A-C or Physics 1-3.*

1. (3) GENERAL CHEMISTRY. Chemical change, three states of matter, solution and crystallization, elements and compounds, oxygen, hydrogen, and the elements of the chlorine group.

2. (3) GENERAL CHEMISTRY. Continuation of course 1. The remaining non-metallic elements; acids, bases, and salts; electrolysis.

3. (3) GENERAL CHEMISTRY. Continuation of course 2. The metals. Qualitative analysis is not taught, but some of the more important analytical reactions are studied, so that at the end of the course the student is expected to be able to recognize any simple salt and to understand the methods of separation of various groups and elements.

The work in chemistry of the second year begins with course 4, one quarter of qualitative analysis given in the fall. This course is prerequisite to all more advanced work. At the beginning of the Winter Quarter the students are divided into three groups. Those intending to pursue chemical studies beyond this year take courses 5 and 6, advanced qualitative and beginning quantitative. Those preparing for medicine or domestic economy, and those who wish a more general knowledge, take courses 7 and 8, organic chemistry. Engineering students take courses 6 and 9, quantitative analysis of engineering materials.

The courses in qualitative analysis begin with simple analysis

and lead to the study of complex mixtures, minerals, alloys, etc. They include the methods of the recognition of the more common organic acids, and of various other substances of special interest and importance to medical students, together with toxicological work. The lectures treat in considerable detail of certain selected portions of theoretical and physical chemistry, special reference being made to the basis of analytical chemistry. Laboratory work, twelve hours a week; lectures and recitations, three hours a week. Textbook, Prescott and Johnson's Qualitative Analysis. Prerequisite: *Courses 1-3.*

4. (3) QUALITATIVE ANALYSIS. Lectures on the theory of analysis. General analysis, including that of complex mixtures and minerals.

5. (3) QUALITATIVE ANALYSIS. Continuation of course 4. Analysis of alloys, etc. Toxocological methods. Lectures on theoretical chemistry.

The courses in organic chemistry consist of lectures and recitations on the simpler types of carbon compounds, and their preparation and purification in the laboratory. Lectures and recitations, three hours a week; laboratory work, twelve hours a week. Prerequisite: *Courses 1, 2, 3, and 4.*

7. (3) ORGANIC CHEMISTRY. The work is based on Perkin and Kipping's Organic Chemistry. Aliphatic series.

8. (3) ORGANIC CHEMISTRY. Continuation of course 7. Aromatic series.

The courses in quantitaive analysis include exercises in gravimetric, volumetric, and electrolytic methods and gas analysis. Theoretical work consists of lectures and recitations on physical chemistry in course 6, and of reading advanced works on general and historical chemistry in courses 9 and following. Courses 10-19 are special courses designed to meet the needs of those who wish to become familiar with the analytical methods employed in regulating the manufacture and determining the purity and value of the substances indicated. The laboratory work in each course is supplemented by the reading of special works treating of the respective subjects. Course 9 is prerequisite to all that follow, and courses 7 and 8 to courses 17-19. Laboratory work, twelve hours; lectures and recitations, three hours a week.

6. (3) QUANTITATIVE ANALYSIS. Continuation of course 5. Simple gravimetric and volumetric determinations leading to course 9. Lectures and recitations on quantitative analysis.

9. (3) QUANTITATIVE ANALYSIS. Moderately complex separations, volumetric precipitations, and oxidation and reduction.

10. (3) IRON AND STEEL ANALYSIS. Including the microscopic structure.

11. (3) IRON ORE ANALYSIS.

12. (3) WATER ANALYSIS. Analysis of drinking water and of boiler feed water, including the analysis of boiler scale.

13. (3) FUEL ANALYSIS. Especially the analysis of coke and coal, including calorific determinations.

14. (3) GAS ANALYSIS. Including both flue gas analysis and illuminating and fuel gas analysis.

15. (3) CEMENT ANALYSIS. Including materials and finished product.

16. (3) COMPLEX MINERAL ANALYSIS. Including silicates, ores, and rare elements.

17. (3) OIL AND SOAP ANALYSIS. Analysis of oils, lubricators, and soaps.

18. (3) PAINT ANALYSIS. Including oils, varnishes, and pigments.

19. (3) FOOD ANALYSIS. The testing of foods for quality and purity.

20. (3) INORGANIC PREPARATIONS.

21. (3) ORGANIC PREPARATIONS.

Biology.

The aim of the work in Biology is to give the student a first-hand acquaintance with animal and plant life. Attention is given both to anatomical structure, and to the life history and habits of animals. Work is carried on by means of lectures, recitations, laboratory and field work.

1. (3) GENERAL BIOLOGY. Classification of biological sciences; physical basis of life; protoplasm, cells, tissues, organs. Classification and distribution of animals. Development, reproduction, evolution, heredity. Animal ecology, habits and instincts. Prerequisite: *Physics 1-3 and Chemistry 1-3.*

2. (3) INVERTEBRATE AND VERTEBRATE ANATOMY.

Biology 1 and 2 form a continuous course, and present a general survey of the animal kingdom. The laboratory work consists of the dissection of selected types, and the miscroscopic study of various animal tissues and forms.

3. (3) HUMAN PHYSIOLOGY. Huxley and Lee's Physiology is used as a text-book. Special attention is given to the structure and function of the central nervous system and sense organs. In the laboratory the student studies the macroscopic anatomy of the higher mammals. Prerequisites: *Biology 1 and 2.*

Philosophy.

The work in Philosophy is intended to give a general outline of

the field of Psychology, Logic, and Ethics, and at the same time to make the student acquainted with the methods and problems of Philosophy.

The work is carried on by means of text-books, recitations, and lectures. Collateral reading from standard authors forms the basis for written theses by the student.

1. (3) PSYCHOLOGY. A description and analysis of the fundamental processes of the mental life, with emphasis on their physiological aspects. James's Psychology, briefer course, is used as a text-book, with assigned readings from other works.

2. (3) LOGIC. The basis of the course consists of a study of conception, judgment, and reasoning in formal logic; but some of the wider applications of logic, such as the relation of language and thought, and the purpose of the thinking process, are studied.

3. (3) ETHICS. The aim of the course is to acquaint the student with the important ethical theories, and their bearings upon the ideal of conduct and life. The student is expected to compare and criticize the different points of view, with a view to forming an independent opinion.

Latin.

The course of study in this department includes, in addition to the usual four years of training preparatory for college, all the work in Latin regularly required in the best colleges for the degree of A. B. The courses are planned with a view to the student's progressive development, and the acquisition of a constantly increasing grasp of the language which shall enable him to read Latin with understanding and comparative ease, and, in the later years of his course, with some amount of literary appreciation of the authors read.

Correct pronunciation with special regard to quantity is insisted upon from the beginning, so that by the time the student has reached the study of Latin poetry the hexameter should present little or no difficulty. In the acquisition of a vocabulary emphasis is laid upon the grouping of related words. Grammatical accuracy and familiarity with the principles of the language are sought rather through careful and constant practice in reading and writing Latin than by committing abstract rules to memory.

With a view to the development of speed and facility in reading special attention is paid to translating at sight and hearing, and to the practice of reading aloud in the Latin with a proper appreciation of the sense of the author. Translation from Latin into English is from the beginning regarded as a part of the student's work in

English composition, and the careless or distorted use of English resulting from literal translation is not allowed. The translation of English into Latin forms an important part of every course, exercises being based in the main upon the text read, but in the later years simple English narrative is substituted. Literature is studied historically as an expression of the life of the people and with reference to the times and the circumstances under which the writers lived, and in the more advanced classes attention is paid to the elements of style and of literary criticism. Systematic supplementary reading is encouraged, for which ample opportunity is offered by a carefully selected library. The work of the classes is supplemented by stereopticon lectures illustrating the monuments of Rome, Roman antiquities, historical sites, and Roman private life.

1, 2. (4) ELEMENTARY LATIN. The student is introduced to the important principles of the Latin language by a seris of graded exercises, intended to render him familiar with the elements of Latin grammar and syntax. Special attention is paid from the outset to correct pronunciation and the training of the ear.

3. (2) ELEMENTARY LATIN. Selections from Ritchie's Fabulae Faciles.

4. (2) SELECTED FABLES AND STORIES from Roman history.

5, 6. (4) SELECTIONS FROM CAESAR'S GALLIC WAR and Ovid's Metamorphoses.

7, 8. (6) CICERO, ORATIONS AGAINST CATILINE. SALLUST, CATALINE. The orations of Cicero and Sallust's Catiline will form the basis of a study of the political and social conditions in Rome at the end of the Republic. That the student may feel in the Latin the spirit of the orations there is frequent drill in reading aloud. In the work of Latin writing special attention is paid during these two quarters to the writing of continuous narratives.

9. (3) CICERO. PRO ARCHIA; PRO MARCELLO; SELECTED LETTERS. Prose writing as in courses 7 and 8.

10. (3) VIRGIL, ÆNEID, I, II. Special care is here given to the literary quality of the student's translations, and written translations of long passages are required. Formal drills in grammar are kept in the background so as to hinder as little as possible the student's interest in the story. Translations at sight, and weekly exercises in Latin writing.

11. (3) VIRGIL, ÆNEID, III, IV. This course is a continuation of course 10.

12. (3) VIRGIL, ÆNEID, V, VI. General review. Latin writing.

13. (3) LIVY, Books XXI and XXII. Latin writing. Collateral reading upon Roman history.

14. (3) TACITUS, GERMANIA AND AGRICOLA. PLATUS, CAPTIVI OR

TERENCE, PHORMIO. The history of Latin comedy. In connection with the study of the Germania, the accounts of early Teutonic institutions, given by Tacitus and Cæsar, are compared.

15. (3) HORACE. Selections from the Odes and Satires, read in such order as to show the ripening and mellowing of the poet's genius, as well as the development of his personality. Review of the period preceding the accession of Augustus; a study of conditions affecting the literature of the Augustan age; lectures upon the life and times of Horace; committing to memory of choice odes. Reading aloud with due attention to quantitative predominance becomes an important means of arousing an appreciation of the music of Horace's verse.

16. (3) PLINY'S LETTERS. The reading is accompanied by informal talks upon the life, private, social, and political, of Pliny's time. The pictures of the age given by Tacitus, Juvenal, and Pliny are compared and discussed.

17. (3) JUVENAL'S SATIRES. Illustrative material of every available sort is used to interpret the text, which is made the occasion of a somewhat detailed study of conditions under Domitian. Collateral readings upon topics suggested by the text, and reports on such reading are required of all students. One day each week is devoted to an outline study of Roman literature, accompanied by lectures and illustrative reading from various authors.

Greek.

The elementary work in Greek (courses 1-4) is adapted to the requirements of college students who wish to begin Greek, and is done in the time usually assigned to it in colleges which offer preparatory Greek.

Academic students who have had two or three years of Latin may be admitted to these classes if their other work is so planned as to allow the requisite time for preparation. Courses 5 to 8 present the work usually required for the A. B. degree.

1. (3) ELEMENTARY GREEK. Emphasis is placed on the necessity of thoroughly mastering the essentials of the grammar. The fact that the student has had at least two years' training in Latin enables him to observe the similarities and differences between Latin and Greek, the value of this comparative study being that it makes the new language appear less strange and thus contributes materially to the learner's progress. The correct placing of accents and breathings is gained by constant practice in writing Greek.

2. (3) ANABASIS, Books I and II: 1, 2. Composition; grammar. The modification of verbal stems, euphonic changes, and drill in the

principal parts of irregular verbs claim special attention. The student's observation is directed to the principles of composition and derivation as an important aid in acquiring a vocabulary.

3. (3) THE ANABASIS, Books II: 3-6, III, IV. Greek writing; grammar. A review is made of the work of the preceding courses. Reading from sight and from hearing is emphasized.

4. (3) HOMER, THE ILIAD, Books I, II, III; selections from IV-XXIV. The essentials of the structure of Homeric verse and the resemblances and differences between the Homeric and Virgilian hexameter are noted. The relation of the Epic to the Attic Greek and the essentials of Homeric syntax receive special attention. The study of words. Exercises in reading Attic Greek and in writing Greek.

5. (3) HOMER, THE ODYSSEY, Selections from Books I-XIII. The study of words. The "Homeric Question." Comparison of Homer and Virgil.

6. (3) PLATO, APOLOGY AND CRITO. XENOPHON, MEMORABILIA. Greek writing. Readings and discussions on (1) the rise of Greek philosophy, (2) Socrates and the Sophists, and (3) Plato and Socrates.

6a. (3) XENOPHON, SYMPOSIUM. PLATO, SELECTIONS FROM THE PROTAGORAS, GORGIAS, EUTHYDEMUS, AND REPUBLIC. The writing of Greek. Collateral reading. (Alternates with course 6.)

7. (3) SELECTIONS FROM LYSIAS AND DEMOSTHENES. The development of Attic oratory. Demosthenes's importance in Greek literature and history.

8. (3) SOPHOCLES, THE ANTIGONE AND ŒDIPUS TYRANNUS. The origin and development of the Greek drama. Outline study of the history of Greek literature.

German.

The methods employed in this department are intended to establish a broad and thorough foundation for an appreciative study of German literature. Courses 1-9 cover a period of three years, when the study of German is begun in the earlier years of the course in the Institute. Separate classes are formed for those who commence German after a preliminary course in Latin. In these classes the work of the three years' course is accomplished in two years.

Accurate and intelligent pronunciation is considered a valuable means for securing accuracy in inflection and fluency in speaking. The principles of phonetics are presented in simple form and repeated practice on exercises prepared especially for this purpose is required both in the class room and in the preparation of the lesson. Colloquial practice is introduced at the outset, taking at first the

form of simple questions on the text, and increasing in difficulty until the entire recitation is conducted in German.

Translation from German into English is regarded as a means to an end, and is discarded when it is no longer needed as a test of the understanding of the text.

In composition direct translation from English into German is employed to some extent, but preference is given to reproductive exercises and independent themes. Exercises of this sort are required at least twice a week throughout the course.

The simpler principles of historical grammar are presented incidentally at an early stage in the course, and constant reference is made to the relation between English and German.

1, 2. (4) ELEMENTARY GERMAN. Drill on pronunciation; the inflection of nouns, adjectives, pronouns, and the simpler forms of verbs.

3. (2) ELEMENTARY GERMAN. Grammar continued. Verb forms are emphasized. Easy prose reading.

4. (2) READINGS IN EASY NARRATIVE PROSE. Continued drill on grammatical forms. Prose composition based on texts read.

5. (2) NARRATIVE PROSE AND ONE EASY COMEDY. Reproductive translation into German. Conversational exercises.

6. (2) SCHILLER'S WILHELM TELL. Reproductive translation and independent themes.

7. (2) HISTORICAL OR BIOGRAPHICAL PROSE. Selections from Freytag's "Bilder aus der deutschen Vergangenheit," or Von Sybel's "Erhebung Europas gegen Napoleon," Jagemann's or Poll's German Composition, twice a week.

8. (2) GOETHE'S GÖTZ VON BERLICHINGEN. Prose composition, reproductive work, and independent themes.

9. (2) A MODERN NOVEL. Sudermann's "Frau Sorge," or Ebner-Eschenbach's "Das Gemeindekind." Independent themes.

9a. (2) Scientific German. This course is co-ordinate with German 9 in the literary course. No student is admitted who has not at least six credits in German. Scientific readers and monographs.

10. (3) ADVANCED GERMAN. Lessing's Emilia Galotti and Hamburgische Dramaturgie. The life of Lessing is studied from English and German biographies, and his earlier dramas are read and reviewed by members of the class.

11. (3) SCHILLER'S WALLENSTEIN AND THIRTY YEARS' WAR. Reference work in history. The structure of the drama is made the subject of especial study.

12. (3) GOETHE'S DICHTUNG UND WAHRHEIT. Many of the earlier productions of the author are read in connection with this work.

especially Die Leiden des jungen Werther. Themes on topics suggested by the readings.

French.

The language is studied for its disciplinary value and for the intrinsic worth of the literature, as well as for the advantage to the scientific student of availing himself of information to be found in French works relating to his special course. Power to speak and ability to read French are sought as a means to breadth of culture. A systematic knowledge of the structure and idioms is obtained through double translation. In all exercises attention is given to the correct use of English.

Courses 1-9 cover a period of three years, when the study of French is begun in the earlier years of the course in the Institute. Separate classes are formed for those who begin French after a preliminary course in Latin. In these classes the work of three years' course is accomplished in two years. Certain changes however, are made in the texts read in order to meet the requirements of more mature students. The following substitutions will be made: In MODERN FRENCH COMEDIES, Le Gendre de Monsieur Poirier (Augier), La Question d'Argent (Dumàs), Cyrano de Bergerac (Rostand); in MODERN FRENCH PROSE, Contes de Daudet (ed. Cameron); in THE ROMANTIC SCHOOL, Les Travailleurs de la Mer (Hugo); in HISTORICAL PROSE, La France Contemporaire (Taine).

1. (2) ELEMENTARY FRENCH. Rudiments of grammar; careful drill in pronunciation, learning by heart of easy expressions, reading of anecdotes and short easy selections. Fraser and Squair's French Grammar.

2. (2) ELEMENTARY FRENCH. Grammar continued; drill on pronunciation; exercises, both English-French and French-English, designed to fix in memory the forms and principles of grammar. Reader, Foster and Aldrich.

3. (2) ELEMENTARY FRENCH. Grammar; special attention given to irregular verbs and idioms; frequent conversational exercises; Grandgent's French composition based on La Derniére Classe (Daudet); Sans Famille (Malot). Le Petit Chose (Daudet).

4. (2) MODERN SHORT STORIES. Reading, Le Tour de la France (Bruno); Colomba (Mérimée); Le Pays de France (Foncin); Contes biographiques (Foa); Le Roi de Montagnes (About); François, French Composition; exercises, written and oral. Conversations based on text read; drill in verb forms and idioms.

5. (2) HISTORICAL PROSE. Reading, Jeanne d'Arc (Lamartine); Historie d'un Payson (Erkmann et Chatrian); Le Siége de Paris

(Sarcey); François' Composition continued; frequent abstracts, sometimes oral and sometimes written, of portions of texts already read.

6. (2) MODERN FRENCH COMEDIES. Reading, Moi (Labiche et Martin); Le Luthier de Crémone, Le Trésor (Coppée); Mlle. de la Seigglière (Sandeau); dictations; frequent résumés of texts read; continued drill on idioms, and constant application in the construction of sentences.

7. (2) Consideration of the Romantic School with special study of VICTOR HUGO. Reading, Quatrevingt-treize; Hernani and La Chute; prose composition, Grandgent's French Composition, Part V; letters, business and friendly. Constant practice in speaking French.

8. (2) MOLIERE. A careful study of his chief comedies and a survey of his art and ideas. Reading, L'Avare, Le Bourgeois Gentilhomme, Les Précieuses Ridicules; dictation; abstracts or reproductions from memory of selected portions of the matter read. Prose, Grandgent's Composition, Part IV; historical narration.

9. (2) THE CLASSIC DRAMA. Corneille, Racine. Reading, Le Cid, Polyeute (Corneille); Athalie, Andromaque (Racine). Dictation. Constant practice in giving French paraphrases of portions of texts read. Duval's Histoire de la Littérature Française is used throughout the year for the study of literature.

9a. (2) SCIENTIFIC FRENCH. This course is co-ordinate with French 9 in the literary course. Scientific readers and periodicals. Prose based on texts read.

10. (3) ADVANCED PROSE COMPOSITION AND CONVERSATION, based on practical subjects. Traveling; At the Custom House; At the Station; The Parisian; The Hotel; The Pension; General Description of Paris; The Chamber of Representatives, etc. Prerequisites, 1-9.

11. (3) GREAT WRITERS OF THE CLASSICAL PERIOD. Pascal, Bossuet, Mme. de Sévigné, Saint Simon, Boileau, Fénelon. Themes in French.

12. (3) CRITICAL PROSE OF THE NINETEENTH CENTURY. Sainte-Beuve, Taine, Brunetière. Themes in French.

Spanish.

Spanish is offered as an elective for advanced students in French and for others who may desire a practical knowledge of the language for business purposes.

1. (2) ELEMENTARY SPANISH. De Torm's Grammar; all exercises written and reviewed orally. Appleton's Readers. Dictation and conversation.

2. (2) ELEMENTARY SPANISH. De Torm's Grammar. El Capitan Veneno (Alarcon). Essays, oral and written. Commercial letters.

3. (2) MARIANELA (GALDOS). Sight reading. Comparative Literature.

Domestic Economy.

The attention of students who are preparing to teach domestic economy is called to the Suggestive Curriculum on page 30. Such a curriculum is also a good preparation for the professional study of nursing and medicine.

1. (2) COOKERY. This course is designed for the younger pupils. It includes six hours a week of practical cooking, and four hours of elementary work in fuels, lighting, cleaning, the care of the house, and the composition of a few simple foods.

2. (2) COOKERY. A continuation of course 1.

3. (2) COOKERY. Most of the time of this course is devoted to practical cooking with the view of covering as much of the work of courses 1 and 2 as the time will permit.

A. (2) SEWING. This course is designed for the younger pupils. It includes the making of plain undergarments, with talks on materials and implements used. Use of machine with simple attachments.

B. (2) SEWING. Taking of measurements, making of undergarments continued, cutting from patterns.

C. (2) SEWING. Cutting and making of shirt waists, thin gowns, and dressing-sacks.

D, E, F, (6) SEWING. These courses are designed for those who are preparing to teach, and include, in addition to the sewing defined under A, B, and C, drafting, the study of textiles, and designing.

G, H, I, (6) SEWING. A continuation of D, E, and F.

In connection with all the courses in sewing, four hours a week may be given to millinery.

4. (1) HOUSEKEEPERS' COURSE IN COOKING. This course consists of practical work in the preparation of food, with the study of the food principles and the effect of heat upon each. It is designed to meet the needs of housekeepers rather than of young students. Two periods a week of two hours each.

5. (1). HOUSEKEEPERS' COURSE IN COOKING. A continuation of

course 4. Instruction is given in the preparation of more elaborate dishes and in serving. Two periods a week of two hours each.

6. (2) HOUSEKEEPERS' COURSE IN COOKING. This course includes the work of courses 4 and 5. Four periods a week of two hours each.

7. (3) DOMESTIC ECONOMY. (a) The cooking of simple foods. The work is arranged to illustrate the different methods of cooking, and the effect of heat upon the five food principles. It includes also a study of the materials used. Laboratory work, four hours a week.

(b) Home Sanitation. A model house is planned, and its situation, ventilation, and plumbing discussed.

(c) The physiology of nutrition.

8. (3) DOMESTIC ECONOMY. (a) A continuation of 7 (a), with advanced work in cookery. The cost of food. Laboratory work, four hours a week.

(b) The chemistry and best methods of heating, lighting, and cleaning. The furnishing of the home.

(c) A continuation of 7 (c).

9. (3) DOMESTIC ECONOMY. (a) Cooking in large quantities. Invalid cookery. Chafing dish course. Dietary work. Laboratory work, four hours a week.

(b) Chemistry of Foods. Tests for the five food principles, and for the detection of adulterations in food.

(c) Fermentation and decomposition.

10, 11, 12, (9). A continuation of 7, 8, and 9.

In connection with courses 7-12 work is given in dietetics. These courses are designed for those who are preparing to teach, and for others who wish instruction in advance of that given in preceding courses.

Free-Hand Drawing.

In the work laid out for free-hand drawing, course 1 is intended to be of general educational value, and a foundation for other work in drawing.

In 2, 3, and 4 students will have an opportunity to carry on the work in drawing with greater liberty in the choice of mediums. It is planned to have this work prepare the student for advanced work in the study of art in art schools.

1. (2) FREE-HAND DRAWING. Drawing in charcoal from geometric solids, introducing fundamental principles of perspective, and

light and shade. Charcoal from casts of features, hands, feet, heads, and historic ornament. One day in the week will be devoted to sketching in pencil and to brief study of art history.

2. (2) FREE-HAND DRAWING. Charcoal from casts. Studies from still life in pen and ink, and wash. Elementary designing.

3. (2) FREE-HAND DRAWING. Water color, pen and ink, wash from still life. Advanced charcoal work.

4. (2) COLORING AND MODELING. Oil or water color, pen, wash, clay modeling, and charcoal.

Physical Culture.

The method of instruction pursued is not limited to any one system. Proper recognition is given to any method the whole or parts of which have been found useful, or which promise efficacy. Consideration is given to hereditary tendencies and to individuality, in physical possibilities, physical condition, and physical tastes. Individual training, therefore, is encouraged in every case, and especially where an examination discloses a student's inability to pursue general or concerted exercises, either from threatened injury or inability to profit by such work.

Students upon entering the Institute are entitled without cost to a thorough physical examination. The examination includes accurate measurements of the physical proportions, a careful examination of the heart, lungs, and spine, and the strength of the principal groups of muscles; at the same time, information is solicited concerning heredity.

In every case where a defect is found in the boy's heart or lungs, he is advised to consult a physician, as the presence only, and not the degree of the defect is determined. Upon the basis of the information so gathered, instruction is given as to particular exercises and the use of various developing apparatus.

In addition to individual work, daily classes are given (commencing immediately after Thanksgiving Recess and continuing to the Easter Recess) in hygienic, educative, corrective, competitive, and recreative gymnastics, adapted as nearly as possible to the needs of individuals of all ages and physical conditions. The exercises so given are carefully graded as to progression, physiological effects, mechanical difficulty, and the boy's power of correct muscular co-ordination.

The boys' gymnasium contains a spacious exercise hall (90x40 feet), equipped with the most approved developing appliances, as well as apparatus for light and heavy gymnastics, hand-ball and

basket-ball courts, shower and sponge baths, locker rooms and lockers, lavatories, visitors' gallery, and instructor's office.

The gymnasium is open from 9 a. m. to 7 p. m., every school day. Attendance is voluntary and free of cost to all. Classes are arranged at such hours as not to conflict with other school duties.

A separate gymnasium is provided for girls, and the courses of instruction outlined above are modified to meet the particular needs of girls.

ATHLETICS.

During the Autumn and Spring Quarters out-of-door athletic games and sports are practiced under the personal supervision of the Instructor in Physical Culture. Only such games and sports are encouraged as the location, character, and athletic equipment of the school make it desirable and possible to pursue.

Students are not permitted to compete on athletic teams without first passing a satisfactory physical examination.

The School of Engineering.

Students are admitted to the Schoool of Engineering on the same conditions as to the School of Arts. Graduates of Chicago high schools and other schools of equal rank are given credit for so much of the work outlined in the curricula as they have mastered, which should be sufficient to enable them to complete the courses of instruction leading to the degree of Mechanical Engineeer in four years.

The School of Engineering limits its work to what may be called the mechanical engineering subjects proper, namely, drawing and designing, shop practice, applied mathematics, steam and electricity, with such electives in the last two years as enable the student to specialize in shop, steam, electrical, or chemical engineering. Instruction in mathematics, physics, chemistry, history, English, and modern languages is given in the School of Arts.

Two curricula are outlined on pages 56 and 57, an Eight-Year Curriculum and a Seven-Year Curriculum, the latter indicating the minimum requirements for the degree. The basis of successful engineering study must be broad and solid, and candidates for the degree are encouraged to secure as complete a general education as time and means permit.

It is the purpose of the Institute to do as much as possible for every individual student, considering the time and money at his command. The greatest service it can render the man of small means is to save his time without sacrificing educational essentials. By careful correlation of work and by methods of individual instruction the Institute has been fortunate in accomplishing this end. Students of good ability entering at the age of fourteen have been graduated at twenty-one. This is a saving of at least two years over customary curricula. It is accomplished by having the student in one atmosphere for the seven most important years of his intellectual life.

SEVEN-YEAR CURRICULUM FOR DEGREE OF M. E.

Year.	Autumn Quarter.	Course No.	No. of Credits.	Hours in Class.	Winter Quarter.	Course No.	No. of Credits.	Hours in Class.	Spring Quarter.	Course No.	No. of Credits.	Hours in Class.
First.	English	1	2	1	English	2	2	1	English	3	2	1
	Mathematics	1	2	2	Mathematics	2	2	2	Mathematics	3	2	2
	German	1	2	1	German	2	2	1	German	3	2	1
	Woodwork	2	2	2	Sketching	1	2	2	Drawing	5	2	2
	Total	....	8	6		..	8	6		..	8	6
Second.	English	4	2	1	English	5	2	1	English	6	2	1
	Mathematics	4	2	1	Mathematics	5	2	1	Mathematics	6	2	1
	German	4	2	1	German	5	2	1	German	6	2	1
	Drawing	6	2	2	Foundry	4	2	2	Forge	3	2	2
	Total	....	8	5		..	8	5		....	8	5
Third.	English	7	3	1	English	8	3	1	History	6	3	1
	Mathematics	12	3	1	History	5	3	1	Mathematics	10	3	1
	Physics	1	3	3	Physics	2	3	3	Physics	3	3	3
	Machine Shop	19	2	2	Drawing	10	2	2	Pattern Shop	7	2	2
	Total	....	11	7		..	11	7		....	11	7
Fourth.	Mathematics	13	3	1	Mathematics	14	3	1	Mathematics	15	3	1
	Chemistry	1	3	3	Chemistry	2	3	3	Chemistry	3	3	3
	German, or	7	2	1	German or	8	2	1	German or	9	2	1
	French or Spanish	1	..	..	French or Spanish	2	..	..	French or Spanish	3	..	..
	Pattern Shop	8	2	2	Drawing	11	2	2	Drawing	12	2	2
	Total	....	10	7		..	10	7		....	10	7
Fifth.	Mathematics	16	3	1	Mathematics	17	3	1	Mathematics	18	3	1
	Physics	4	3	3	Physics	6	3	3	Physics	5	3	3
	Descriptive Geom	25	2	2	Kinematics	28	2	2	Eng'g Laboratory	15	2	2
	Machine Shop	20	2	2	Machine Shop	22	2	2	Machine Shop	23	2	2
	Total	....	10	8		..	10	8		....	10	8
Sixth.	Statics	16	3	1	Dynamics	17	3	1	Strength Materials	18	3	1
	Valve Gears	31	2	2	Steam Engine Des'n	32	2	2	Thermodynamics	43	3	1
	Electrical	35	3	2	Electrical	36	3	2	Electrical	37	3	2
	Foundry	9	2	2	Forge	21	2	2				
	Total	....	10	7		..	10	7		....	9	4
Seventh.	Thesis	51	2	1	Thesis	51	4	2	Thesis	51	3	3
	Hydraulics	42	2	1	Machine Design	27	2	2	Structural Design	33	3	2
	Steam Boilers	44	2	1	Engine Tests	45	2	2	Power Plant Tests	49	3	3
	Testing Machinery	46	2	1	Hydraulic Mach'ry	47	2	2	Specifications and Contracts	50	1	1
	Eng'g Laboratory	48	2	2								
	Total	....	10	6		..	10	8		....	10	9

Chemistry may be substituted for two years of shopwork.

EIGHTH-YEAR CURRICULUM FOR DEGREE OF M. E.

Autumn Quarter.	Course No.	No. of Credits.	Hours in Class.	Winter Quarter.	Course No.	No. of Credits.	Hours in Class.	Spring Quarter.	Course No.	No. of Credits.	Hours in Class.
nglish	1	2	1	English	2	2	1	English	3	2	1
athematics	1	2	2	Mathematics	2	2	2	Mathematics	3	2	2
atin	1	2	1	Latin	2	2	2	Latin	3	2	1
ketching	1	2	2	Woodwork	2	2	2	Drawing	5	2	2
Total		8	6			8	6			8	6
nglish	4	2	1	English	5	2	1	English	6	2	1
athematics	4	2	1	Mathematics	5	2	1	Mathematics	6	2	1
atin	4	2	1	Latin	5	2	1	Latin	6	2	1
orge	3	2	2	Foundry	4	2	2	Drawing	6	2	2
Total		8	5			8	5			8	
athematics	12	3	1	History	5	3	1	History	6	3	1
hysics	1	3	3	Physics	2	3	3	Physics	3	3	3
erman	1½	3	1	German	3	3	1	German	4½	3	1
Total		9	5			9	5			9	5
nglish	7	3	1	English	8	3	1	Mathematics	10	3	1
hemistry	1	3	3	Chemistry	2	3	3	Chemistry	3	3	3
erman	7	3	1	German	8	3	1	German	9	3	1
Total		9	5			9	5			9	5
athematics	13	3	1	Mathematics	14	3	1	Mathematics	15	3	1
rench or Spanish	1	2	1	French or Spanish	2	3	1	French or Spanish	3	2	1
rawing	10	2	2	Drawing	11	2	2	Drawing	12	2	2
hemistry	4	3	3	Chemistry	5	3	3	Chemistry	6	3	3
Total		10	7			10	7			10	7
hysics	4	3	3	Physics	5	3	3	Physics	6	3	3
athematics	16	3	1	Mathematics	17	3	1	Mathematics	18	3	1
escriptive Geom.	25	2	2	Kinematics	28	2	2	Eng'g Laboratory	15	2	2
achine Shop	19	2	2	Machine Shop	20	2	2	Pattern Shop	7	2	2
Total		10	8			10	8			10	8
atics	16	3	1	Dynamics	17	3	1	Strength Materials	18	3	1
hemistry	9	3	3	Chemistry	10	3	3	Chemistry	11	3	3
alve Gears	31	2	2	Steam Eng. Design	32	2	2	Thermodynamics.	43	3	2
lectrical	35	3	2	Electrical	36	3	2	Electrical	37	3	2
Total		11	8			11	8			12	7
hesis	51	2	1	Thesis	51	4	2	Thesis	51	3	3
ydraulics	42	2	1	Machine Design	27	2	2	Structural Design	33	3	2
team Boilers	44	2	1	Engine Tests	45	2	2	Power Plant Tests	49	3	3
esting Machinery	46	2	1	Hydraulic				Specifications and			
ng'g Laboratory	48	2	2	Machinery	47	2	2	Contracts	50	1	1
Total		10	6			10	8			10	9

Shopwork may be substituted for two years of chemistry.

Courses of Instruction in the School of Engineering.

Engineering.

The work classified under this head embraces applied mathematics, applied electricity, testing of machinery and instruments, drawing and designing, shop practice, and machine construction.

The aim is to present these subjects in such order and comprehensiveness as to meet the requirements of those who complete the courses and those who do not, enabling some to throw their entire energy into professional studies and others to receive the fundamental instruction necessary for practical work on leaving the Institute.

While the work outlined has direct bearing on the training of the mechanical engineer, the student who expects to follow any branch of engineering or architecture will find much that will be of service in his subsequent work.

The location of the Institute allows advantage to be taken of extensive and varied manufacturing establishments, and throughout the four years there will be required of each student in the Engineering Courses monthly visits of inspection, under the direction of an instructor, to some shop where notes and sketches will be made. These trips will usually be made on Saturdays. A familiarity with constructive work on a scale and variety impossible in one shop will thus be obtained.

In the shops and in the drawing rooms of the Institute, methods and principles will be presented, when possible, by exercises of ultimate value as parts of machines or apparatus.

In shop and drawing room and laboratory work, time cards are made out daily by each student, stating the character of work done, materials, number of machine, and drawings used. These are kept on file and transferred at the end of each six weeks to sheets, showing at a glance the variety of work performed, hours on different machines, etc.

1. (2) FREE-HAND SKETCHING. This course is designed to enable the student to work constructively in perspective, and to make neat dimension sketches of machine parts.

2. (2) WOOD WORK. Uses and care of tools. Exercises in sawing, planing, and laying out work. Application of the ordinary carpenter's and joiner's tools, such as saws, bench, rabbeting and moulding-planes, chisels, gouges, brace and bits, hammer, square, bevel, etc., in the construction of the principal joints used in carpentry and joinery. Center, face plate, screw and hollow chuck, and templet turning. Distinguishing characteristics of the various kinds of wood in ordinary use and the methods of finishing.

2a. (2) WOOD WORK (*Advanced course*). This course affords those who have gained some facility in the handling of carpenters' tools further practice in their use, and also an opportunity to do more advanced work. Applications of the principles given in course 2 to methods of laying out and constructing frames, of buildings, roofs, roof trusses, bridges, etc., doors, door frames, window sash and frames, stairs and stair railing, and various forms of apparatus for chemical, physical, and engineering laboratories.

3. (2) FORGE WORK. Management of fire. Practice in drawing out, upsetting, bending, forming, fullering, swaging, punching and welding of iron and mild steel. Tool-steel working, hardening and tempering. Illustrations of the effect of differences in the composition of iron and steel upon their mechanical properties, and the method of treating the different cases.

4. (2) FOUNDRY WORK. Preparing and mixing sand and facings, bench and floor mouldings of ordinary patterns; match plate work, making sand and plaster follow boards; making, baking, and setting cores; crucible melting; management of furnace, preparing charges of iron and brass; cleaning lining, and charging cupola; melting, skimming, pouring, cleaning, and tumbling castings.

5. (2) INSTRUMENTAL DRAWING. This is the first work with drawing instruments. Lettering and couventional representations of frequently recurring parts of machines, such as nuts, threads, fastenings, etc. Construction of mathematical curves. This course is designed to establish standard methods of lettering, dimensioning and conventional representations.

6. (2) PROJECTION DRAWING. The knowledge and use of planes of projection, intersections, including conic sections, revolution of views and development of surfaces are acquired in this course.

7. (2) PATTERN-MAKING. Practice in the use of general woodworking machines, such as the surface planer, joiner, circular and band saws, lathe, trimmers, shoot-board, and the ordinary hand tools; in the preparation, cutting, fitting and gluing of stock used

in the making of patterns, and the necessary core-boxes of angle and surface plates, collars, flanges, pipe fittings, valves, pulley rings, hand wheels, etc.

8. (2) PATTERN-MAKING (*Advanced course*). Application of the methods of the preceding course to the making of patterns for general machine work, including hangers, journal boxes, pulleys, sheaves, spur, bevel, and worm gears, machine details, engine frames, cylinders, valves, etc., match plates, follow boards, sweeps for loam work, skeleton core-boxes, and patterns.

9. (2) FOUNDRY WORK (*Advanced course*). Floor moulding, including patterns of complicated form requiring the use of drawbacks, anchor plates, cheeks, etc.; dry sand, loam, and pit moulding, sweep work, and green sand core making. Mechanical properties of the different grades of pig iron and their mixtures.

10. (2) MECHANICAL DRAWING. Practice in detail and assembly drawing and tracing of machines. The proper completion of this course should insure a competent tracer. Prerequisites, two courses from Engineering 3, 4, and 7.

11. (2) MACHINE DESIGN SKETCHING. This course has for its object facility in putting on paper sketched designs which can afterwards be put into shop drawings.

12. (2) Problems involving the adaptive and inventive faculties with reference to shop processes and limitations of tools. Practice is given in drafting-room methods employed in tooth gearing. Prerequisites, *Engineering 3, 4, 7, 19, and 11.*

15. (2) ENGINEERING LABORATORY. Such work with engines, boilers, generators, motors, dynamometers, and testing machines as is needed to give the student that familiarity with them requisite to the intelligent study of electrodynamics, thermodynamics, mechanics, and machine designs. Prerequisites, *Engineering 10 and 19; Mathematics 14, Physics 3.*

16. (3) STATICS. Composition and equilibrium of concurrent forces; parallel forces and center of gravity; couples and composition and equilibrium of non-concurrent forces; suspended weights and catenary.

17. (3) DYNAMICS. Uniform motion, falling bodies, Newton's laws, and mass; accelerated motion; impact; virtual velocities, moment of inertia; work, energy, power; friction.

18. (3) STRENGTH OF MATERIALS. Elementary stresses and strains, tensions, compression, shearing, and torsion; flexure of beams; continuous girders, flexure of long columns.

19. (2) BENCH METAL WORK. Clipping, filing, and polishing of cast and wrought iron and steel; laying out work, drilling, tapping, reaming, scraping flat surfaces to surface plate. Illustration and

designation of the different shapes and cuts of files and the uses to which they are adapted.

20. (2) MACHINE TOOL WORK. Explanation of the construction of the different forms of machine tools; directions for operating and keeping tools in order. Practice in centering, plain, taper, and templet turning, chucking, drilling, boring, external and internal thread cutting; hand tool turning, filing, polishing; planing, shaping, plain milling; forms of cutting tools and instructions in grinding.

21. (2) FORGE WORK (*Advanced course*). Machine forging and steam hammer work; various methods of hardening, tempering, and case hardening; brazing; duplicate work; use of jigs and dies for bending and forming. Forge shop design and equipment; estimation of costs.

22. (2) TOOL AND SCREW MAKING. Use of the lathe, drill press, planer, shaper, universal miller, universal grinders, hand tools, standard gauges, micrometer, and vernier calipers, in construction of accurate reamers, taps, dies, and straight, spiral, angular, side, end, and formed milling cutters, etc. Setting up and operating screw machine; making machine screws, nuts, studs, and formed work.

23. (2) MACHINE TOOL WORK (*Advanced course*). Continued practice in the use of machine tools in the boring, turning, sizing, and cutting of spur, bevel, and spiral gears; worms and worm wheels. Planing, milling, scraping, fitting, and finishing the sliding surfaces and parts of machines.

24. (2) MACHINE ERECTING. Practice in assembling, erecting, finishing, fitting, and adjusting complete machines.

25. (2) DESCRIPTIVE GEOMETRY. Graphical methods of solving problems of intersections of lines, planes, surfaces and solids, and developed shapes. Practical problems designed to secure facility in the application of principles. Prerequisites, *Engineering 11, Mathematics 14.*

27. (2) SPECIAL MACHINERY DESIGN. The design of some machine which will exhibit the observational, inventive, and analytical ability of the student is undertaken in this course. Students must have completed the previous courses in engineering and physics outlined in the curricula leading to the degree of M. E. before taking this course.

28. (2) KINEMATICS. A study of the laws of motion, linkages, gearing, and problems in the determination of combinations to secure required motions. Prerequisites, *Engineering 12, Mathematics 14.*

31. (2) VALVE GEAR DESIGN. The familiarity of the student with kinematics, and his previous practice in drawing are made use of in

this course in the investigation of various valve gear motions, and applied to problems in actual designing. Prerequisite, *Engineering 15.*

32. (2) STEAM ENGINE DESIGN. A study of the fundamental problems of steam engine design, such as the influence of the weight of reciprocating parts on steady running, etc. A theoretical design will be undertaken and compared with the practice of leading builders.

33. (3) STRUCTURAL STEEL WORK. The study of trusses, plate girders, and detail used in building frames, bridges, roofs, and cranes. The subject of specifications according to current practice will be carefully considered.

35. (3) DIRECT CURRENT PRINCIPLES AND PRACTICE. Lectures and laboratory work. Magnetic and electric calculations for generators and motors; armature windings; characteristic curves; wiring; instruments. Prerequisites, *Engineering 15, Mathematics 16, 17, and 18; Physics 4, 5, and 6.*

36. (3) ALTERNATING CURRENT PRINCIPLES. Lectures and laboratory work. Sine functions; vectors; reactance; condensance; impedance; series parallel circuits; transmission lines. Prerequisite, *Engineering 35.*

37. (3) ALTERNATING CURRENT MACHINERY. Lectures and laboratory work. Transformer; generator; induction motor; synchronous motor; rotary converter. Prerequisite, *Engineering 36.*

42. (2) HYDRAULICS. The law governing fluids in motion, flow of water through orifices and pipe, losses of head by friction; hydraulic motors and their efficiencies. Prerequisite, *Engineering 18.*

43. (3) THERMODYNAMICS. Mechanical theory of heat; laws of thermodynamics as applied to heat engines and refrigerating machines; analysis of the action of injectors and other steam apparatus. Prequisite, *Mathematics 18, Engineering 15.*

44. (2) STEAM BOILERS. The various forms and peculiarities of modern boilers, the proportion of heating surface, grate areas, and chimney capacity, as related to the best performance under various conditions; the various apparatus related to boilers. Prerequisite, *Engineering 15.*

45. (2) ANALYTICAL LABORATORY TESTS. Tests of steam calorimeters; coal and gas fuel value determinations; fuel gas analysis; lubricating oil tests.

46. (2) TESTING MACHINERY PRACTICE. Tests of materials of construction; determining the elastic limit and ultimate strength under tension, compression, and torsion. Prerequisite, *Engineerng 18.*

47. (2) HYDRAULIC MACHINERY TESTS. Hydraulic experiments in the flow of water through pipes and orifices; pumps of various kinds tested for the duty performed under known conditions of power

furnished by steam or mechanically transmitted power. Prerequisite, *Engineering 15 and 18.*

48. (2) POWER MEASUREMENT TESTS. Application of rope, hydraulic and Prony brakes and use of Morin, Weber, cradle floating and other forms of transmitting dynamometers for determination of absorbed or transmitted power. Analysis of refined engine tests.

50. (1) SPECIFICATIONS AND CONTRACTS. Commercial specifications and contracts, such as the engineer is likely to require a general knowledge of, are treated in a regular course of lectures supplemented with occasional addresses by men who have given extensive study to special phases of the subject.

51. (9) THESIS. Each candidate for degree of mechanical engineer is required to present a thesis on some engineering subject which he has investigated during his senior year. In this work he is thrown largely on his own responsibility, and must present a thesis showing capacity for careful observation, invention and deduction. The subject should be chosen before the close of the junior year and submitted to the head of the department for approval. In the autumn quarter one hour a day is devoted to the literature on the subject, in the winter three hours a day to preparing apparatus and preliminary experiments, and in the spring five hours a day to completing the investigation and writing results. Frequent consultations with the instructor in whose field the subject is chosen and a written weekly report of progress are required. The thesis shall be typewritten, of standard dimensions and binding and deposited in the library before graduation.

SCHEDULE OF COURSES OF INSTRUCTION FOR YEAR 1905-06.

DAY COURSES.	Room.	Autumn Quarter. Hours and Courses.									Winter Quarter. Hours and Courses.									Spring Quarter. Hours and Courses.								
Instructors.		8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4
English.																												
Lewis	5	..	9	9	11	..	..	..	..	..	..	10	10	13	..	..	..	..	..	..	11	12	14	..	..	..	..	..
Kohlsaat	32	..	7	..	4	..	4	..	1	..	..	8	..	5	..	5	..	2	..	..	8	..	6	..	6	..	3	..
Gustafson	27	..	..	..	..	..	1—7	..	..	..	..	..	..	..	..	8	7	..	..	..	..	..	..	..	1—8	..	..	..
Owen	29	..	..	1—6	7	..	4	..	1	..	..	..	7	8	..	5	..	2	..	..	1—8	8	..	..	6	..	3	..
Miller	21	..	..	..	..	..	4	7	1	..	..	..	..	..	..	5	8	2	..	..	..	..	..	..	6	8	3	..
Andrus	25	..	7	..	..	..	4	..	1	..	..	7	..	..	..	5	..	2	..	..	..	..	8	..	6	..	3	..
Williams	21	..	1	7	4	..	..	..	..	..	..	2	8	5	..	..	..	..	..	..	3	1	6	..	..	..	..	..
Woodle	22	..	1	..	4	..	..	..	1	..	..	2	..	5	..	..	..	2	..	..	3	..	6	..	..	..	3	..
Serven	19	..	..	..	..	..	..	..	15	..	..	..	..	..	..	..	..	15	..	..	..	..	..	..	..	..	..	..
History.																												
Mann	36	..	2	..	3	..	4	7	..	..	..	10	..	5	..	5	8	..	..	..	3	..	6	..	6	9	..	..
Fertig	35	..	1	1	1	..	..	..	..	..	..	2	2	2	..	..	..	..	..	3	..	1	1	..	..	..	..	..
Mathematics.																												
Greeson	26	13	..	4	13	..	..	4	..	..	14	5	..	14	..	..	5	..	..	13	6	..	15	..	..	6	..	..
Moseley	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	18	..	..	..	..	..	..	..
Studley	4	..	16	16	10	..	10	6	..	..	..	17	17	10	..	10	6	..	..	..	14	..	10	..	12	10	..	..
Thomas	38	..	1	6	4	..	3	12	..	..	..	2	12	5	..	13	12	..	..	15	3	12	6	..	..	4	..	..
Fertig	37	..	..	..	..	..	1— 1	..	..	..	..	..	..	..	..	2— 2	..	..	..	..	..	..	..	..	3— 3	..	..	..
Pope	24	..	3	1—1	..	..	4	7	..	..	..	3	2— 2	..	..	5	8	..	..	..	1	3— 3	..	..	6	9	..	..
Wheeler	37	4	1	..	12	..	..	..	..	..	..	2	5	13	..	..	..	..	..	..	3	6	14	..	..	..	..	..
Lay	28	10	4	1— 1	..	..	1— 1	..	..	..	4	4	2— 2	..	..	2— 2	..	..	..	5	5	3— 3	..	..	3— 3	..	..	..
Schenck	37	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6a	..
Engineering.																												
Chamberlain	7	25	25	31—31	..	..	48—51	..	..	..	..	28	32—32	..	..	45—45	..	..	..	..	43	15—15	..	..	49—50	..	..	..
DePuy	59	..	..	20—23	..	..	20—23	..	20—23	..	..	..	20—23	..	..	20—23	..	20—23	..	..	..	20—23	..	..	20—23	..	20—23	..
Moseley	6	42	16	44—46	..	..	..	..	..	..	17	..	47—47	..	..	..	..	27—27	..	18	..	..	..	..	33—33	..	..	..
Ross	79	2— 2		2— 2	..	..	2— 2		7— 8	..	..	..	2— 2	..	..	2— 2		7— 8	..	..	..	2— 2	..	..	2— 2		7— 8	..
Hoyt	99	4— 4		4— 4	..	..	..		9— 9	..	4— 4		4— 4	..	..	..		4— 4	..	4— 4		4— 4	..	..	..		4— 4	..
Bacon	D	3— 3		3— 3	..	..	..		3— 3	..	3— 3		3— 3	..	..	..		21—21	..	3— 3		3— 3	..	..	..		3— 3	..
Schenck	95	1— 1		1— 1	..	..	10—12		..	..	1— 1		1— 1	..	..	11—11		..	..	10—10		12—12	..	..	1— 1		..	..
Hawley	96	6—10		6—10	..	..	..		5— 6	..	6—10		10—12	..	..	..		5— 6	..	6— 6		6— 6	..	..	..		5— 6	..
Nies	39	..	..	35—35	..	..	..	..	..	..	..	..	36—36	..	..	..	..	..	..	..	..	37—37	..	..	..	..	..	..
Wheeler	97	..	..	..	..	..	5— 6	..	..	..	..	..	..	..	..	5— 6	..	..	..	..	..	..	..	..	5— 6	..	..	..
McCabe	97	5— 5		5— 5	..	..	..	..	..	..	5— 5		5— 5	..	..	..	..	..	..	5— 5		5— 5	..	..	..	..	..	..
Havens	57	..	..	..	..	..	19—19		19—19		..	..	..	..	..	19—19		19—19		..	..	..	..	..	19—19		19—19	
Kinney	9	..	..	..	..	..	..	..	..	..	2— 2		..	..	..	..	..	..	..	2— 2		..	..	..	..	..	..	..

DAY COURSES.	Room.	Autumn Quarter.									Winter Quarter.									Spring Quarter.								
		Hours and Courses.									Hours and Courses.									Hours and Courses.								
Instructors.		8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4
Physiography.																												
Peet	30	2—	2	2—	2	..	..	..	..	..	1—	1	1—	1	..	..	..	..	..	2—	2	2—	2	..	..	..	..	..
Adams	30	..	..	..	..	..	2—	2	..	..	..	..	..	..	..	1—	1	..	..	..	..	..	..	..	2—	2	..	..
Physics.																												
Woodworth	55	..	1	1	1	..	..	..	..	..	..	2	2	2	..	..	..	..	..	..	3	3	3	..	..	..	..	..
Rogers	54	..	..	..	..	4—	4	4	4—	4	..	..	..	..	6—	6	6	6—	6	..	..	..	..	5—	5	5	5—	5
Nies	48	..	..	..	..	..	1	1	1	..	..	..	..	..	..	2	2	2	..	..	..	..	..	..	3	3	3	..
Chemistry.																												
Smith	74	..	..	1	1—	1	4	..	..	..	..	..	2	2—	2	5,7	..	..	..	..	..	3	3—	3	6,8	..	..	..
Trowbridge	66	A	A	4—	21	..	..	4—	21	..	B	B	5—	21	..	..	5—	21	..	C	C	6—	21	..	..	6—	21	..
Horn	68	1—	1	A	..	..	1—	1	1—	1	2—	2	B	..	..	2—	2	2—	2	3—	3	C	..	..	3—	3	3—	3
Biology.																												
Adams	46	..	..	..	1—	1	..	..	..	..	..	..	..	2—	2	..	..	..	..	..	..	..	3—	3	..	..	..	..
Philosophy.																												
Adams	46	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..
Latin.																												
Nelson	47	..	13	4	10	..	1—	1	..	..	..	15	5	11	..	2—	2	..	..	9	..	6	12	..	3—	3	..	..
Tenney	44	..	1	7	4	..	..	..	..	..	..	2	8	5	..	..	..	..	..	14	3	..	6	..	..	..	..	..
Street	40	..	4	1—	1	..	..	..	..	..	..	5	2—	2	..	..	..	..	..	..	6	3—	3	..	..	..	..	..
Greek.																												
Street	40	..	..	..	..	..	1	4	..	..	..	..	..	..	..	2	5	..	..	..	..	..	..	..	3	6	..	..
German.																												
Jones	41	..	7	10	1½	..	7	..	..	..	..	8	11	3	..	8	..	..	..	..	9	12	4½	..	9	..	..	..
Peet	42	..	4	..	4	..	4	1½	..	..	..	5	..	5	..	5	3	..	..	..	6	..	6	..	6	4½	..	..
Forster	45	..	1	1	..	..	1	..	..	..	..	2	2	..	..	2	..	..	..	..	3	3	..	..	3	..	..	..
French.																												
De Lagneau	20	7	7	10	1½	..	4	..	..	..	8	8	11	3	..	5	..	..	..	9	9	12	4½	..	6	..	..	..
Forster	45	..	..	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	3	..	..	..	..	..
Spanish.																												
Staud y Ximenes	27	..	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..
Dom. Economy.																												
Smith	64	7—	7	4—	4	..	..	..	10—	10	8—	8	5—	5	..	..	..	11—	11	9—	9	6—	6	..	..	..	12—	12
Ingersoll	83	..	A	A—	A	..	D—	G	..	..	..	B	B—	B	..	E—	H	..	..	..	C	C—	C	..	F—	I	..	..
Hassard	67	7—	7	7—	7	..	1—	1	..	..	8—	8	8—	8	..	2—	2	..	..	9—	9	9—	9	..	3—	3	..	..
Foote	83	..	..	A—	A	..	D—	G	..	..	..	..	B—	B	..	E—	H	..	..	..	..	C—	C	..	F—	G	..	..
Pitner	83	..	..	A—	A	..	D—	G	..	..	..	..	B—	B	..	E—	H	..	..	..	..	C—	C	..	F—	G	..	..
Drawing.																												
Blanke	86	..	1	—	3	..	1	—	3	..	.	2	—	4	..	2	—	4	..	..	3	—	5	..	3	—	5	..

Evening Session of 1905-6

October 9 to May 18

CALENDAR

FIRST TERM 1905				SECOND TERM 1906				THIRD TERM 1906			
Mon. & Th.		Tues. & Fri.		Mon. & Th.		Tues. & Fri.		Mon. & Th.		Tues. & Fri.	
OCTOBER				JANUARY				MARCH			
9	12	10	13	..	4	2	5	..	15	13	16
16	19	17	20	8	11	9	12	19	22	20	23
23	26	24	27	15	18	16	19	26	29	27	30
30	..	31	..	22	25	23	26	..	..	..	..
..	..	..	..	29	..	30	..	..	..	..	..
NOVEMBER				FEBRUARY				APRIL			
..	2	..	3	..	1	..	2	2	5	3	6
6	9	7	10	5	8	6	9	9	12	10	13
13	16	14	17	12	15	13	16	16	19	17	20
20	..	21	..	19	22	20	23	23	26	24	27
27	30	28	..	26	..	27	..	30	..	..	..
DECEMBER				MARCH				MAY			
..	..	..	1	..	1	..	2	..	3	1	4
4	7	5	8	5	8	6	9	7	10	8	11
11	14	12	15	12	..	..	..	14	17	15	18
18	..	19	..	..	..	..	..	21	..	..	..

The Institute is open from 7:30 to 9:30 four evenings a week. Some of the courses of instruction are given on Monday and Thursday evenings, others on Tuesday and Friday evenings. The courses are so arranged as to make it possible for a student to take one course and attend two evenings a week, or two courses and attend four evenings a week. The tuition for one course of instruction, two evenings a week, for a term of ten weeks, is five dollars; for two courses of instruction, four evenings a week, ten dollars. In addition to the tuition, a fee of five dollars a term is charged for laboratory and shop courses.

Schedule of Evening Classes for Session of 1904-05.

Instructors.	Courses of Instruction.	Room.	Evenings.	Terms.
Bacon.....	Forge Work.....	D	Mon. & Th...	A. W.
Bailey.....	Mechanical Drawing ...	96	Mon. & Th...	A. W. S.
Breyfogle..	Latin.....	40	Tue. & Fri..	A.
Brown.....	Cookery.....	67	Mon. & Th...	A. W. S.
De Lagneau	French.....	20	Tue. & Fri...	A. W.
DePuy.....	Machine Shop.....	59	M. T. T. F...	A. W. S.
Forster....	Mechanical Drawing	97	Mon. & Th...	A. W. S.
Grzybowski	Mechanical Drawing.....	76	Mon. & Th...	A. W. S.
Hawley....	Mechanical Drawing.....	96	M. T. T. F...	A. W. S.
Heaney....	Latin.....	40	Tue. & Fri..	W. S.
Henning...	Mechanical Drawing.....	97	Tue. & Fri..	A. W. S.
Hoyt.....	Foundry.....	99	Mon. & Th...	A.
Hulbird....	Physics Laboratory.....	54	M. T. T. F...	A. W. S.
Jackson....	English.....	22	M. T. T. F...	A. W. S.
Kane.....	Physical Culture.....	11	Mon. & Th...	A. W. S.
King.....	Physics Laboratory.....	48	Mon. & Th...	S.
Lane.....	Electrical Laboratory.....	39	Mon. & Th...	A. W. S.
McCabe....	Machine Shop.....	57	M. T. T. F...	A. W. S.
McCurdy..	Cookery.....	67	Tue. & Fri...	A. W. S.
Morgan....	Engineering Mathematics.	37	Tue. & Fri...	A. W. S.
Moseley...	Engineering Mathematics.	37	Tue. & Fri...	A. W. S.
Nies.....	Electrical Engineering....	39	Tue. & Fri...	A. W. S.
Robbins..	Mechanical Drawing.....	76	Tue. & Fri...	A. W. S.
Rogers.....	Electrical Engineering....	39	Mon. & Th...	A. W. S.
Ross.....	Wood Work.....	79	Tue. & Fri..	A. W. S.
Schenck...	Machine Design.....	78	Tue. & Fri..	A. W. S.
Shaw.....	Accounting.....	24	Tue. & Fri..	W. S.
Smith.....	Chemistry.....	68	Mon. & Th...	A. W. S.
South.....	Arithmetic.....	28	Tue. & Fri...	A. W. S.
Staud.....	Spanish.....	28	Mon. & Th...	A. W. S.
Taft.....	Machine Shop.....	59	M. T. T. F...	A. W.
Thomas....	Algebra and Geometry....	26	M. T. T. F...	A. W. S.
Trowbridge	Chemistry.....	66	Mon. & Th..	A. W. S.
Tuck.....	Algebra.....	27	M. T. T. F...	A. W. S.
Walters....	English.....	21	M. T. T. F...	W. S.
Wheeler...	Steam Engineering.....	B	Tue. & Fri..	A. W.
Wicherski..	English.....	21	M. T. T. F...	A.
Winters....	Penmanship.....	24	Mon. & Th...	A. W. S.
Woodworth	Electrical Engineering....	55	Mon. & Th...	A. W. S.

Special Evening Courses.

I. ENGINEERING PRINCIPLES AND PRACTICAL MATHEMATICS (*First year*).—One hour each evening given to lecture and one hour to solution of problems. This course is intended to meet the needs of students, mechanics, electricians, and all artisans who wish to obtain the basis for a reading knowledge of the fundamental principles common to the Mechanical Engineering branches. Great care is taken to present the topics in a clear, concise way in the simplest possible language.

II. ENGINEERING MATHEMATICS.—Algebra, Geometry, Trigonometry, and Graphical Calculus applied to Engineering Problems. The prerequisite is course 1, practical mathematics, or its equivalent. This course is undertaken with the purpose of carrying the student further in mathematics, and the applications of mathematics to engineering problems. Much attention is given to graphical processes—their use in the study of forces, velocities, solution of equations, interpolation, mensuration, etc.

This course is planned to be of value to those who, in design, operation, or test, find that simple mathematical and graphical work gives them trouble.

III. ELECTRICAL ENGINEERING (*Second year*).—This course embodies the study of the following subjects with demonstration by the student: Construction and use of Wheatstone bridge; electrical energy lost in heat in incandescent lamp; determination of mean vertical, horizontal, and spherical candle power of incandescent lamp; proper rating and lamp target for incandescent lamp; efficiency and life determination of primary batteries; test of storage battery; resistance and ground by voltmeter method; construction and use of tangent galvanometer; curves and constants for Siemen's dynamometer; conductivity tests of commercial copper; commercial efficiency of a D. C. motor; magnetic leakage of a dynamo; dynamo characteristics; electrical efficiency of D. C. arc lamps.

IV. ELECTRICAL ENGINEERING (*Third year*).—This course is arranged to meet the need of electrical artisans and technical school graduates. Among the subjects treated are: Alternating waves; resistance, reactance, and condensance, separately and in combination; power factor; vector method of representing alternating waves; single phase and polyphase transmission lines; single phase and polyphase induction motors; synchronus motors; rotary converters and transformers; transformer testing; two phase to three phase transformation; M-phase to N-phase transformation; metering of polyphase systems.

V. STEAM ENGINEERING.—The following are among the subjects treated in this course: determination of strengths of materials; determination of stress and strain in a bridge truss; efficiency of simple machines; rope and chain tackle, test of a centrifugal machine, prony friction brake, cradle dynamometer test for an electric motor, work and efficiency of hydraulic ram; calculation of power; gas engine and calculation of power; calculation of condenser capacity; calculation of boiler capacity; calculation of pump capacity; calculation of ice machine capacity; taking indicator cards and calculating H. P.; boiler trial; engine friction and steam used; gas engine, trial and gas used per H. P.; various forms of prony brake; efficiency tests of injectors; calibration of steam gauges and thermometers; tests of steam pumps.

University Extension Lectures.

In 1904-05 the following lectures were given at the Institute on Thursday evenings:

I. THE FAR EAST.—By Toyokichi Iyenaga, Ph.D.

1. Russo-Japanese Struggle.
2. The War and the Powers.
3. The Problem of China.
4. The Missionary Question in China.
5. Rise of Japan, and Her Place in the Orient.
6. The East and the West.

II. THE MODERN NOVEL.—By Richard Burton, Ph.D.

1. The Beginning: Richardson and Fielding.
2. The Development of Personality in Fiction.
3. The Novel of Character.
4. The Novel of Action.
5. The Triumph of Realism.
6. The Return of Romance.

III. THE SPIRITUAL ELEMENT IN TRAGEDY, Part II.—By S. H. Clark, Ph.B.

1. Shakespeare's "Hamlet": A Tragedy of the Head.
2. Shakespeare's "Othello": A Tragedy of Unmitigated Evil.
3. Shakespeare's "Julius Cæsar": A Tragedy of the Idealist.
4. Stephen Phillips's "Paola and Francesca": A Tragedy of the Heart.
5. "Job": The Triumph of Faith.
6. Shakespeare's "Henry V.": The Poet's Hero King.

IV. THE BEGINNING OF CHRISTIANITY.—By Herbert L. Willett, Ph.D.

1. Preparation of the World for Christianity.
2. Judaism and Christianity.
3. Peter and Jewish Christianity.
4. Paul and Gentile Christianity.
5. John and Universal Christianity.
6. The First Century of Christian History.

V. ART AND LIFE.—By Charles Zueblin, Ph.B., D. B.

1. The Gothic Revival.
2. Thomas Carlyle and the Ethics of Work.
3. John Ruskin and the Ethics of Wealth.
4. William Morris, Master Workman.
5. The Arts and Crafts Movement.
6. Public Art.

The lectures for 1905-06 will be given on Thursday evenings, beginning October 5. The season will open with a course of six lectures on "From Social Utopias to Practical Politics" by Prof. John Graham Brooks, who will consider in the series:

1.—The First Great Utopia.
2.—Utopias in the Name of Christ.
3.—From Fourier to Brook Farm.
4.—The Utopia of Trade Unionism.
5.—The Utopia of the Socialists.
6.—The Best of Them All.

The program for the remainder of the season will include a series of six lectures on "The Slavic World" by Prof. Edward A. Steiner of Iowa college; six lectures on "Master Writers of the Bible" by Prof. Herbert L. Willett, and either a course of six lectures on "American Literature" by Prof. Richard Burton or a similar series on "Specimen Novels of Great Modern Novelists" by William Norman Guthrie. A fifth course on science by Prof. F. R. Moulton on "Other Worlds Than Ours," is also contemplated.

Summer Session of 1905.

July 10 to August 18.

Three quarters and a summer term of six weeks make a school year of forty-two weeks, leaving ten weeks for vacation.

The courses of instruction in the Institute are so arranged that pupils who attend the summer term may, to that extent, shorten the total time requirement. It is manifestly to the advantage of those who remain in the city to devote to study a part of the twelve weeks of the summer.

The summer term gives an opportunity for those who wish to supplement work done in other schools with such instruction in science and the practical arts as the laboratory and shop equipment of the Institute make it possible to offer.

The summer term enables pupils who have fallen behind in the work of the year to make up deficiencies. Review classes are formed covering the work of each year in the high school in English, history, mathematics, physics, chemistry, Latin, Greek, German, and French.

The arrangement of classes is such as to make it possible for a pupil to complete one or two courses of instruction in the term of six weeks. The usual hours are from eight to twelve in the forenoon.

Any course of instruction offered by the Institute will be repeated in the summer if the demand is such as to justify the formation of a class.

The cost of instruction for the summer term is five dollars for one course, and ten dollars for two courses of instruction.

In physics and in chemistry, one course counts as two courses, because of the extra laboratory requirements.

Special Summer Circular may be had on application.

General Meetings, 1904-1905.

Sept. 28. Chapel. Address by Director Carman.

Oct. 12. Allen C. Lewis Society. Speeches by representatives of student organizations.

Oct. 26. Chapel. Address by the Hon. Joseph E. Gary, of the Superior Court: "To-day."

Nov. 8. Allen C. Lewis Society. Debate by collegiate sophomores: *Resolved*, That the United States should withdraw from the Philippines immediately.

Nov. 9. Lecture by Professor Camillo von Klenze, of the University of Chicago, on Modern Germany.

Nov. 15. Lecture by the Rev. M. Berchelait, of New York, on "The Need of the French Language in the United States."

Nov. 23. Memorial exercises for members of the Institute recently deceased.

Dec. 7. Allen C. Lewis Society. Debate by collegiate freshmen: *Resolved*, That segregation of the sexes in recitation would be for the best interests of Lewis Institute.

Jan. 4. Chapel Address by the Hon. Charles S. Cutting, of the Probate Court: "Opportunity."

Jan. 18. Allen C. Lewis Society. Literary and musical exercises.

Feb. 1. Chapel. Address by Henry G. Foreman, Esq., President South Park Commissioners: "Recreation Needs of Chicago."

Feb.15. Allen C. Lewis Society. Debate by Fourth Year students: *Resolved*, That the wealth and power of the captains of industry are a menace to the welfare of the American people.

March 1. Chapel. Concert by the musical organizations.

March 7. Address by the Hon. Frank B. Sanborn, LL.D., of Concord: "Reminiscences of Concord."

March 15. Allen C. Lewis Society. Address by J. Hamilton Lewis, Esq.: "Race Prejudice."

April 5. Chapel. Presentation of Athletic Prizes by William Hale Thompson.

April 19. Allen C. Lewis Society. Debate by Fourth Year students: *Resolved*, That the government of England more truly represents the wishes of the people than does the government of the United States.

May 17. Allen C. Lewis Society. Debate by Fourth Year students: *Resolved*, That labor benefits a nation more than capital.

May 29. Chapel. Memorial Day exercises. Address by Dr. E. P. Murdock.

Eighth Annual Commencement.

June 22, 1905.

Degrees Conferred.

Mechanical Engineer.

H. Walter Forster
Francis H. Hill
Julius Klima
George Arthur Main
Frank Merrill
Harold Pratt Weaver

Titles Conferred.

Associate in Arts.

Charles W. Adams
Mabel Aldridge
Belle Babb
Helen Bally
Charles Lee Benson
Ruth Bergmann
Genevieve Marie Brickwood
George Hubert Bristol
Mary Anna Clark
Helen Cyrus Collins
Winifred Collins
Mary B. Cooley
Florence Davidson
Rosalie Decker
Jessie G. Dudman
Adeline Eiszner
George Reinhard Faust
Zoe Ella Fisk
Elizabeth Fullenwider
Lilia B. Garms
Edith Hall
Arthur Charles Hoffman
Paul Alexander Hoffman
Clara Jophes
Elsie Kellogg
Charles Reinhard von Kolkow
Elizabeth Lander
Madeleine Depew Lucas
Arlisle Esther Mather
Edna Newton McCallum
Grace Dorothy McMahon
Amy K. Meader
Theodore Calvin Pease
William C. Pusey
Harriet Rinaker
Ella Margaret Robertson
Marguerite Roeschlaub
Elizabeth Schreiber
James Hubert Skiles
Imogene Smith
June Southwick
Mary Josephine Sullivan
Frances Talcott
Alma Trowbridge
Nathan R. Wakefield, Jr.

Students in the School of Arts.

The names of students taking evening, summer, or special courses are not included in the following lists.

The figures after the names of students indicate the number of credits obtained at the end of the Winter Quarter, March 24, 1905, and completed without conditions, or credited to them on advanced standing. Students are classified as Associates, when they have received 144 credits, Candidates for Title of Associate, when they have 90 credits, and Candidates for Academic Certificate when they have less than 90 credits. For definition of credit, see page 27.

Associates in Arts.

Bally, Helen.....159
Bell, Beatrice.....164
Benson, Charles L.....167
Bergstrom, Anna T.....177
Bristol, George H.....152
Carnes, Portia.....147
Clinnin, Josephine M.....179
Collins, Helen C.....B. S.
Cooley, Mary B.....B. L.
Fullenwider, Elizabeth.....B. S.
Gunthorp, Martha J.....162
Hall, Edith.....154
Jacobson, Olga.....173
Kilner, Louise M.....164
Kolkow, Charles R. von.....152
Markey, Margaret.....168
Mather, Arlisle.....147
McMahon, Eva.....164
Nelson, Mathilda.....171
Nourse, Edwin.....147
Rinaker, Harriet.....A. B.
Robertson, Harriet L.....167
Roome, Elsie C.....162
Vannetta, Hattie C.....170
Welch Susie E.....159
Wilcox, Wayland D.....149
Wilson, Bess M. E.....159

Candidates for Title of Associate.

Aldridge, Mabel.....142
Amacker, Anna..... 94
Amberg, Robert..... 90
Anderson, Agnes..... 95
Babb, Belle.....138
Baer, Robert..... 94
Baker, Flossie.....100
Barker, Hazel P.....105
Bates, Alben F..... 94
Behl, Anna L.....106
Bergman, Adele..... 90
Bergman, Ruth.....141
Bradford, Clarkson B.....105
Brenton, Kennicott..... 91
Brickwood, Genevieve M.....136
Carter, William A.....120
Case, Emma L.....108
Chapman, Edith M..... 94

t, Mary A.....133
ıa, Winifred.....139
, Jacob.....108
ıllo, Eunice.....118
ıer, Gertrude M.....106
z, Adolph..... 94
k, Frances.....129
iff, May..... 96
ıe, Selma.....100
ieil, Juliet..... 95
ison, Florence.....134
er, Rosalie.....138
aff, Albert H.....101
l, Grace E.....106
ımond, Irene.....102
nan, Jessie G.....134
ann, Louise H.....110
ıer, Adeline C.....134
ıer, Bessie J.....102
ı, Frederick H.....121
t, George R.....143
eisen, Laura..... 98
man, Oscar..... 96
, Zoe E.....141
s, Grace M.....106
klin, Matilda.....111
ıs, Lilia B.....141
Nelle L.....108
, Mildred L.....109
ıs, E. Preble..... 91
ıecke, Grace L.....106
man, Arthur C.....135
man, Paul A.....137
e, Marjorie..... 94
ık, Apolena..... 90
ter, Mabel R.....107
berg, Prudence..... 92
son, Antonia.....107
son, Lena.....107
es, Clara.....141
ey, Cora..... 94
ogg, Elsie.....132
iall, Ruth..... 97
irick, Agnes.....109
Kerner, Robert.....112
King, George R..... 99
Kralovec, Lydia.....110
Krock, Arthur B.....102
Krulewich, Essie.....105
Lander, Elizabeth.....140
League, Paul M.....126
Lucas, Madeline.....143
Martin, Edwin.....102
May, Rexford L..... 91
McCallum, Edna M.....142
McCurdy, Lulu F.....100
McKinley, Martha B.....106
McMahon, Agnes E.....111
McMahon, Grace.....141
Meader, Amy.....140
Miller, Alice E.....108
Mix, Robert R.....106
Ohlendorf, Clarence O.....105
O'Neil, Estelle G..... 93
Patrick, Elizabeth.....104
Patton, Leigh.....100
Pearce, George..... 97
Pease, Theodore.....139
Price, Sue..... 96
Righeimer, Lucy.....109
Robbins, Daisy.....120
Robertson, Ella M.....142
Roeschlaub, Marguerite.....137
Scholes, Ethel.....118
Schreiber, Elizabeth.....141
Servis, Howard H..... 93
Sievert, Elsie S.....102
Silverberg, Annette.....111
Skiles, J. Hubert.....141
Smith, Beatrice.....102
Smith, Imogene.....142
Smith, Winifred M.....104
Southwick, June.....140
Spence, Nellie G.....111
Stickel, Joseph..... 95
Strawbridge, Mabel.....110
Sullivan, Mary J.....140
Swift, Florence R..... 99

Talcott, Frances.....140
Touzalin, Clara B.....108
Towne, Elizabeth.....108
Trowbridge, Alma.....138
Wakefield, Nathan R.....140
Wallace, Clara.....122
Wernicke, Harry.....113
Westgate, Lucy A..... 98
White, Elizabeth S..... 94
Whiting, John T..... 91
Wilder, Lawrence R..... 95

Candidates for Academic Certificate.

Ackley, Floyd N..... 40
Adams, Elizabeth E..... 83
Alexander, Edward..... 16
Alexander, Lelia..... 40
Anderson, Eleanor..... 8
Aurand, Arthur G..... 34
Baker, Bernice..... 10
Baldwin, Helen..... 22
Balis, Grace..... 62
Bankes, Florence P..... 16
Baragwanath, Elsie..... 40
Baragwanath, Genevieve..... 14
Barber, Russell M..... 14
Bates, Margaret..... 70
Beilfus, Emily L..... 68
Beilfus, Matilda..... 16
Benson, Mildred..... 16
Betz, R. Irving.....
Beverley, William N..... 82
Birkhoff, John H..... 40
Bishop, Arthur H..... 28
Bishop, Jessie..... 74
Bishop, Mabel..... 50
Blatchford, John..... 52
Borg, William..... 4
Bottom, Burt C..... 65
Boughey, Bessie..... 12
Bradshaw, Ethel F..... 8
Brosseau, Joseph..... 52
Bryan, Marie..... 33
Burke, Alexander..... 83
Burton, Harry E..... 10
Busse, John..... 30
Campbell, David T. H..... 16
Campbell, Margaret G..... 37
Carstens, Albert..... 26
Cella, Rose..... 4
Champion, Myrtle O..... 30
Charpier, Eugene..... 28
Clarke, Frederick W..... 16
Clenny, Helen..... 12
Cleophas, Cornelia B..... 32
Cohen, Fanny..... 44
Cook, Edwin T..... 8
Cooke, Alfred B..... 42
Cooke, James L..... 71
Coon, Harry J..... 61
Cooper, James E..... 6
Cooperstein, Joseph..... 31
Cox, Walter..... 12
Coyne, Frederick E..... 39
Cross, Roy T..... 16
Cummings, Glenn..... 12
Dahl, Harold L..... 88
Darsie, Marvin..... 88
Davey, Doris A..... 16
Davies, Gladys..... 30
DeCamp, Grace T..... 47
DeWitt, Evelyn I..... 36
DeWitt, Helen C..... 58
Dohnal, Ignaz..... 16
Dooley, Gertrude..... 40
Dubia, Avis..... 10
Dundas, Arthur J..... 32
Dyar, Huntington H..... 58
Edison, Isadore..... 8
Edstrom, Edward E..... 16
Edwards, Walter..... 65
Ehrat, Anna..... 46
Eldred, Warren B..... 16

son, Geoffrey C..... 38
s, Irving..... 17
s, Roy H..... 6
, F. Hazel..... 28
, Mildred..... 65
r, Myra S..... 34
ore, Mildred..... 28
isen, Florence..... 50
erald, Barrett..... 36
lers, Junius..... 89
lers, Paul A..... 10
, Emily..... 89
, Ella..... 14
en Edna..... 32
r, Janet..... 16
r, Marjorie..... 89
man, Cara..... 2
man, Florence..... 38
ing, Alma..... 26
, Edith E..... 12
n, Fred..... 4
in, Robert F..... 53
mith, Sadie..... 59
s, Kate R..... 20
es, Elmer H..... 16
s, Winona..... 49
, James F..... 26
, Marybelle..... 34
old, Gladys..... 6
, Florence..... 14
erson, Ruth E..... 51
korn, Anna..... 4
nberg, Nathan..... 10
nann, Ernest..... 13
s, Grace..... 73
in, Fred M..... 2
ed, Harty S..... 24
ey, Nellie..... 36
r, George W..... 22
es, Zera R..... 10
s, Christine..... 8
s, Nancy..... 34
an, J. Richard..... 76
s, Katherine..... 8
Hawxhurst, Ralph R..... 80
Hawxhurst, Waldo..... 20
Heap, William C..... 10
Heile, Robert..... 20
Heinsen, Anna..... 8
Hench, Horace..... 87
Herhold, Lydia..... 12
Hill, John A..... 14
Hill, Leonard..... 65
Hinchliff, Alice..... 82
Hofrichter, Joseph..... 37
Holden, Grace..... 45
Holden, K. Marion..... 14
Holmes, O. Wendell..... 24
Hood, Clara L..... 8
Hooper, Mildred..... 30
Horn, Grace M..... 34
Hovland, Edna..... 56
Hunter, Edna M..... 62
Huszagh, R. LeRoy..... 28
Huszagh, Victor L..... 38
Huth, Nydia..... 54
Ilett, Marie..... 8
Jacobson, Gudrun..... 8
Jarvis, Florence H.....
Jenkyns, Jennie..... 10
Jensen, Katherine..... 52
Jevne, Grace O..... 25
Johnston, Arthur..... 40
Jones, Grace G..... 6
Kaul, Heinrich..... 4
Kehr, Paul..... 68
Keiler, Arthur J..... 46
Keirnan, Marie J..... 28
Kemnitz, Arthur..... 14
Kimball, Russell H..... 32
Kimbell, Arthur..... 16
Kimbell, Grace C..... 6
Kimbell, Mary O. T..... 8
Kimbell, Pauline J..... 6
Kirchoff, Herbert..... 4
Kirchoff, Margaret..... 16
Kistenbroker, Waldemar..... 13
Klaner, Fred A..... 8

Klein, Laura A..... 8
Klein, Nellie..... 36
Knapp, Harriet A..... 12
Knoll, Robert H..... 10
Knox, Marion..... 22
Kohtz, J. Louis..... 87
Kokes, Joseph E..... 16
Kokes, Rose.....
Koop, Elsa..... 33
Krueger, Fredrica D..... 80
Kuttler, Fred J..... 22
Lamoreaux, Rose..... 8
Lange, Eleanor..... 28
Larson, Jennie N..... 16
Larson, Lawrence C..... 28
Lasher, Charles W..... 48
LeBosky, Leo..... 4
Leman, Edwin D..... 36
Loeding, Sophia..... 10
Lorenzen, William..... 8
Loring, Elsie B..... 12
Main, Elsie F..... 74
Mallen, Nettie G..... 10
Martin, Gail E..... 38
Mason, Roderick W..... 4
Masters, Ada L..... 34
Matthews, Helen E..... 4
Maxwell, W. Stirling..... 6
McCarthy, John V..... 6
McCauley, Jennie..... 31
McNay, Gerald A..... 36
Menzel, Emma S.....
Merriell, George H..... 14
Merriell, Lyle L.....16
Metzger, Mary B..... 6
Meyer, Walter..... 23
Midgley, Edith L..... 40
Mikkelson, Elizabeth..... 27
Miller, E. Loraine..... 10
Mojonnier, Julius..... 16
Moody, Marie A..... 40
Morris, Palmer..... 12
Mulvaney, Mabel G..... 4
Murdock, Winifred D..... 14
Nagl, Marie..... 34
New, Therese..... 47
Newbert, Leroy W..... 58
Newton, Fred..... 4
Newton, Harold J..... 34
Newton, Irene..... 34
Nicholl, Ellis H..... 40
Nichols, George R..... 60
Nicholson, John W..... 78
Niemann, Herbert..... 16
Nordhaus, Theodore..... 2
Novak, Frank J..... 51
O'Brien, Janet..... 16
Oleson, George..... 80
Olff, Meta..... 24
Olstad, Josephine..... 2
Osbornson, Caroline E..... 71
Pardee, Theron..... 38
Peet, Dorma..... 75
Pentecost, William L..... 26
Perrill, Rodney..... 40
Phillips, Ethel..... 40
Pierce, Cornelia..... 16
Pierce, Helen..... 58
Pio, J. Percival..... 82
Powell, Wilbur S..... 40
Prosser, Treat D..... 10
Purvis, Robert F..... 28
Rabe, Magdalene..... 75
Radmore, Eleda..... 62
Raymer, Abigail..... 45
Raymond, Alma E.....
Reddick, James R..... 54
Reiss, Joseph..... 73
Reiter, Joseph A.....
Renschler, Evalyne..... 13
Rice, Walter T.....
Richardson, Florence..... 52
Richman, Samuel..... 68
Roberts Margaret..... 2
Robinson, Myra B..... 48
Rosenthal, David M..... 15
Roth, Helen..... 16
Rudolph, Louis..... 24

Ruehl, Fred..... 10
Rutz, Edward C..... 6
Ryan, Mabel..... 40
Samels, Edgar A..... 14
Sander, Lulu..... 18
Schaefer, Harriet R..... 10
Schlueter, Christian H..... 40
Schock, Kellogg A..... 16
Schofield, Gertrude..... 64
Schofield, Mary..... 24
Schooler, Nathaniel..... 36
Schroeder, Otto M..... 24
Sennott, Joan M..... 12
Shafer, M. Etta..... 50
Sherman, Oren G..... 78
Shotwell, J. Leonard..... 33
Simington, Francis J..... 78
Skallerup, F. Maud.....
Skinner, Murray M..... 37
Smith, Beulah.....
Smith, Emory..... 40
Smith, Eugene G..... 26
Smith, Glenn A..... 16
Snite, Fred B..... 74
Sommerfeld, Otto..... 57
Speed, Louise M..... 39
Spengler, Walter J..... 61
Stein, Irving..... 69
Steinbrecher, Rose..... 32
Stoltze, Caroline..... 50
Swissler, William R..... 71
Szmergalski, Theodore..... 61
Taylor, May..... 80
Taylor, Roy C..... 50
Ten Eycke, Clyde H..... 8
Thatcher, Everett..... 48
Thayer, Charles..... 51
Thode, Clara M..... 12
Thompson, J. Clifford..... 84
Thompson, Elmer G..... 58
Thomson, Elizabeth..... 59
Thomson, Howard A..... 40
Thorp, Lovey M. I..... 21
Thorsen, George S..... 28
Thurtell, Earl F.....
Titley, Cora L..... 30
Titus, Robert V..... 40
Tower, Raymond C..... 65
Towers, Walter K..... 89
Triner, Camilla..... 38
Triner, Ella..... 30
Trout, Thomas..... 88
Tuohy, Arthur C..... 59
Tuohy, Paul..... 10
Tweedie, Douglas H..... 10
Uhlhorn, Walter..... 60
Verhoeff, Jack.....
Visher, Stephen S..... 53
Volk, Carl..... 36
Vopicka, Victoria A..... 28
Voss, Fred..... 6
Waite-Robinson, Ralph..... 8
Walker, Robert G..... 79
Wallace, Florence..... 28
Warner, Rawleigh..... 16
Wathier, Ethel M..... 34
Wathier, Lionel J..... 4
Wegg, David..... 53
Wegner, Rose..... 12
Weil, Henry T..... 33
Weisfield, Yetta..... 20
Wilder, Paul..... 12
Williams, Frances..... 8
Withey, Edward..... 32
Wolfenstetter, Ethel J..... 34
Wright, Earl E..... 16
Yaxley, Leona B..... 40
Zahn, Louise..... 23
Zoelck, Tillie..... 16
Zoelck, Rose..... 15

Unclassified Students.

Albrecht, L. Maud.
Anderson, Lucy J.

CANCELLED

Baldwin, Alice E.
Bond, Rebecca M.
Brocksmit, Gertrude.
Brown, Vivian.
Bruckner, Eugene.
Buck, Emma.
Burwash, Elvira T. J.
Chillson, May E.
Christiansen, Ingeborg.
Cleophas, Gertrude.
Cohen, Bernhard.
Collins, Nellie.
Conant, Nettie M.
Conlon, Ellen.
Cory, William.
Day, Warren E.
Dresh, William.
Ellis, Alberta.
Evans, Lydia.
Foote, Orra M. S.
Fredenhagen, Franz.
Ganey, Henry J.
Garver, Frank S.
Geerdes, Emma A.
Gordon, Bertha F.
Hassett, Alice U.
Hazzard, Ocie M.
Heine, Martha von.
Henne, Elsa.
Hirsh, Alice.
Hogan, Blanche.
Johnston, Bertha.
Juhnke, Leo A.
Juhnke Mary F.
Kammerling, Walter W.
Kelley, Walter L.
Kirk, Nancy D.
Knight, Louise H.
Lander, Elizabeth.
Lockwood, Addie R.
Loeffler, Bertha.
Love, Minnie E.
Ludwig, Edgar.
Mack, George.
Maher, Irene J.
Marsh, James A.
Masters, Harry B.
Medwedeff, Sophia.
Melendy, Emma L.
Mercey, Henry D.
Meserve, Marshall W.
Moe, Chester.
Murray, John W.
Nettinger, Jessie E.
Oldright, Josephine.
Pitner, Ina K.
Privat, Grace.
Roach, Rudolph C.
Roeschlein, Elizabeth.
Rudolph, Louis.
Smith, Helen.
Speis, Helen M.
Stanton, Edna F.
Sunderlin, Gertrude.
Taylor, Martha G.
VanDorn, Edith.
Voborsky, Alice.
Waite, Raymond.
Ward, Irene.
Warder, Russell.
Warner, John.
Wells, Cherrill.
Wernecke, Martha.
Wetzel, Frances.
White, Florence.
Wiles, Kate.
Wolff, Henry J. D.
Woodward, Ella.

Students in School of Engineering.

The names of students taking evening, summer, or special courses are not included in the following lists.

Students are classified as Candidates for the Degree of M. E. when they have 90 or more credits, and Candidates for the Academic Certificate, when they have less than 90 credits.

Candidates for the Degree of M. E.

Adams, Charles W.....138
Ahlschlager, Walter..... 99
Allen Chester M.....107
Allen, Frank L.....116
Allen, Harry B.....106
Arp, Clarence K..... 91
Becker, Walter.....111
Bergman, Ernest.....106
Borg, Charles.....124
Buechner, William A.....122
Byron, Frank.....106
Cleophas, Herbert.....108
Cohn, David.....100
Conway, James.....109
Dieckman, Albert.....100
Erwin, James A.....179
Ewertsen, Christian..... 90
Fitzsimmons, James A.....130
Ford, J. Blaine.....123
Forster, Walter.....185
Freeman, Clinton H.....114
Friedman, Myron..... 90
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Gregg, Harold E..... 90
Grossberg, Arthur..... 99
Gunton, Perley.....103
Haber, Michael.....142
Hall, Eugene C.....133
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Hancock, Edwin..... 99
Hanson, Edwin O.....104
Happel, Fred C.....107
Harlev, Arthur..... 98
Havens, Fred L.....139
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Kilner, Harold.....121
Kimbell, Roy M.....101
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Kob, Charles.....142
Kopf, Melrose G.....103
Levey, Clarence..... 97
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Riffel, Bernhard.....169
Ritchie, Prescott.....113
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Simon, Zera.....107
Singer, David.....132
Skooglund, David..... 90
Smyth, John U.....112
Sommerfeld, Waldo.....128
Stone, Porter E.....108
Strauss, Walter O.....140
Sullivan, William T.....133
Thelin, Victor E.....114
Thorndyke, J. Everett.....103
Todd, Emery.....146
Tolsted, Elmer.....168
Wales, Henry S..... 90
Warr, Harold G..... 90
Weaver, Harold P.....167
Weinert, Max.....108
Wheaton, Jesse R.....116
Whitehead, Richard H. R.... 92
Wieboldt, Raymond..... 99
Wig, Rudolph.....144
Williams, Glenn R.....110
Wolcott, Kenneth O.....129
Wolf, William J..... 90

Candidates for Academic Certificate.

Abbott, Arthur W..... 14
Adkins, George A..... 40
Alexander, Walter..... 14
Allan, William S..... 40
Anderson, Arthur E.....
Arentz, Paul R..... 22
Ashby, Raymond C..... 43
Ashby Wilbert..... 72
Atwater, Harry A..... 52
Bacon, Malcolm..... 16
Bannister, Harold D. C..... 16
Bartik, Edward..... 32
Bassett, Cyrus W..... 40
Bauer, Leonard.....
Bauerle, Robert..... 14
Bauerle, William W..... 16
Bauman, Wilbert M..... 10
Baumann, Alfred..... 40
Beckwith, James L..... 79
Benjamin, Edward P..... 16
Bishop, Robert..... 14
Blades, Leonard J..... 3
Bloss, Eugene..... 59
Booth, Frank H..... 16
Bourgeois, Borel O..... 44
Brand, Paul..... 36
Brannum, James H..... 51
Bray, William J..... 46
Brooks, Don M..... 12
Brower, Everell S..... 18
Brown, Earl G.....
Brown, J. Warren..... 39
Budan, Max..... 37
Callaghan, John J..... 32
Carlson, George..... 68
Carqueville, Charles.....
Chadwick, Harold H..... 8
Chapman, George N..... 41
Chiville, Gerald D..... 66
Christianson, Walter..... 28
Clark, Delmer..... 50
Clough, Kendrick H..... 8
Coda, Charles A..... 16
Coda, Fred..... 12
Corrin, Richard..... 12
Corvinus, Fred N.....
Cox, Truell B..... 16
Crane, Ryerson..... 32
Curtis, Arthur J. R..... 63
Darnall, C. Allen..... 42
Davenport, F. Earl..... 70
Davidson, Albert J..... 83

Joseph O..... 10
ı, Abraham..... 43
ıg, Robert E..... 26
, Earl..... 14
:, Alfred O..... 60
chs, Hans O..... 14
en, Walter..... 44
y, Walter..... 51
, Walter..... 2
ı, Charles..... 54
William H..... 11
dgar..... 18
·ds, Dudley S..... 57
Edwin R..... 8
Edward A..... 8
n, Leo G..... 18
, Clarence O..... 16
olt, Adolph C. H..... 26
, Arthur..... 54
Francis L..... 40
ırg, Oscar A..... 26
ırg, Louis..... 49
ı, James B..... 14
George E..... 36
ıith, Alonzo..... 45
ın, Frank T..... 24
Charles F..... 26
aux, Lewis E..... 22
ı, Walter..... 34
n, D. Grant..... 38
LeRoy..... 62
an, Theodore M..... 30
w, Leo S..... 6
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ıgton, Fred H..... 14
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Harris, George C..... 16
Harrison, Charles I..... 49
Harvey, Arthur H..... 62
Hatch, Lawrence R..... 56
Hauber, Clemens..... 38
Hawkins, Ray W..... 32
Hayes, William H..... 48
Heath, William C..... 50
Hedman, Herbert..... 6
Heffron, Arthur D..... 10
Heine, Henry von..... 2
Henderson, Byron..... 34
Henning, Arthur..... 61
Herman, Alfred..... 52
Herrling, Robert..... 6
Hilderbrandt, George..... 12
Hill, Edward C.....
Hodges, Albert B..... 62
Hoffman, Arthur E.....
Hollis, Raymond D..... 24
Holmberg, Alfred V..... 50
Holzworth, Frank A..... 12
Hotchkin, Paul M..... 80
Howard, Robert..... 78
Howard, William R..... 38
Hubbard, Allen M..... 14
Huerth, Theodore..... 14
Hyndman, Earle..... 70
Jacobi, Will O..... 81
Janssen, Fred V..... 22
Jenkins, Claude C..... 59
Jenkins, Edgar..... 41
Johnson, G. Alvin..... 12
Johnson, Forbes..... 40
Johnson, George A..... 41
Jones, J. Llewellyn..... 32
Kaindl, Arthur..... 75
Kalvelage, John T..... 4
Kane, David..... 10
Karll, Lambert A..... 64
Kehm, Robert J..... 61
Keir, Clarence..... 14
Kelly, John..... 22

Kemnitz, Ernest..... 50
Kenney, John..... 40
Kester, Lawrence W..... 10
Keyes, Blair L..... 63
Kidder, Walter..... 71
Kissinger, Alexander..... 38
Kistenbroker, Arthur W..... 73
Kittredge, Alfred R..... 65
Klamt, Edward..... 16
Klinke, Harry W..... 4
Koepke, Frank O..... 89
Kohout, Jerome..... 82
Korup, Christian..... 58
Kramer, Henry P..... 4
Kretchmer, Francis P..... 4
Kreuder, Thomas R.....10
Kuehne, Alfred..... 26
LaMontaine, Sidney J..... 67
Langford, Homer.....
Larson, Henning J..... 33
Leitner, Charles B..... 38
Lind, Harry..... 36
Lindelsee, George E..... 6
Link, Emery R..... 32
Loeding, George..... .. 40
Longley, Clifford B..... 22
Lotz, Herbert F..... 14
Lundberg, Mansfield..... 6
MacLeod, Norman L..... 38
Madison, Chester E..... 4
Major, Roscoe E..... 10
Marble, A. Philbrick..... 29
Markowitz, Jacob..... 16
Mathisen, Julius A..... 14
McCabe, Charles..... 69
McCarthy, T. J. Perley..... 32
McCorkle, James C..... 10
McDaniels, Frank L..... 83
McHale, Lawrence A..... 25
McKee, Charles B.....
McMullan, William L..... 16
McWhirter, David A..... 48
McWilliams, J. Edgar..... 6
Medbery, William..... 6
Mendel, Edward..... 6
Meyer, Harry W..... 30
Miller, Burt J..... 6
Miller, Henry..... 14
Miller, Robert H..... 34
Millholland, Ernest..... 38
Moffett, Frank E..... 56
Moore, George R..... 75
Moste, Maurice..... 38
Moynihan, Matthew..... 4
Mullen, William..... 30
Newman, James..... 2
Nicholl, William B..... 62
Nichols, George H..... 64
O'Connor, James..... 40
Olsen, Oscar..... 22
Ostergreen, Edgar..... 18
Pack, Ferguson..... 67
Packer, Glenn W..... 40
Page, Orville..... 69
Palamaris, Constantine..... 24
Palmer, Clyde C..... 54
Patitz, George..... 83
Peak, Willard S..... 10
Peters, Walter..... 8
Peterson, Harold..... 10
Peterson, Harold T..... 30
Peterson, Harry..... 6
Peterson, Harvey E..... 36
Phalen, A. Victor..... 8
Pierce, Albert E..... 28
Pilat, Robert..... 34
Player, N. John..... 62
Pollard, Henry..... 49
Pond, Frank H..... 40
Porter, M. Bailey..... 32
Porter, Irving D..... 50
Pravdiza, Thomas..... 77
Pursell, William F..... 14
Puster, Dumas E..... 16
Puster, J. Harold..... 14
Rabe, Edwin O..... 66

.eyer, John H.....
ın, Earl..... 61
, Frank..... 10
vski, Edward..... 32
tobert D..... 58
ınd, Albert W..... 68
C. Edward..... 68
John E..... 6
ga, Henry..... 8
, William..... 10
haus, J. Arthur..... 14
William E.....
l, J. Murray..... 34
s, Keith..... 14
ıfeller, William..... 10
·s, Elmer G..... 6
Palmer W..... 80
ıerg, Lewis..... 12
l, Emerson C..... 16
James..... 34
John..... 16
r, N. Earl..... 24
r, Roswell K..... 16
, Alvin H..... 73
.el, Victor E.....
er, Charles..... 12
Albert A..... 4
, Adolph..... 26
ıann, Charles..... 2
nger, Fred A..... 26
it, Carl H..... 73
it, Walter.....38
:t, Henry P..... 10
.er, Paul J..... 28
.ins, Arthur..... 40
, Walter..... 6
, William..... 84
e, Fred H..... 4
rtz. Louis..... 10
lger, Edwin..... 77
Leo..... 8
lich, Edgar..... 30
Augustus W..... 40
an, Victor L..... 68
Siebel, Emil A..... 85
Singer, E. Albert..... 32
Skiles, Frank..... 43
Smail, Elmer S..... 40
Smith, Charles F..... 12
Smith, Edward A..... 86
Smith, Horace..... 2
Smith, A. Warren..... 68
Snyder, Melville S.....
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Sterneman, Edward P..... 22
Steuer, William F..... 6
Stevens, Byron J..... 6
Stewart, Floyd..... 10
Stewart, William A.....20
Suter, Frederick W..... 34
Taylor, Percy J..... 82
Teegarden, Charles W..... 59
Thompson, Roy S..... 86
Tischer, Arthur H. V..... 61
Toban, Frank..... 4
Troyke, Alfred..... 16
Tylor, Charles..... 10
Vockel, Clarence..... 20
Vogt, Joseph H..... 12
VonPlachecki, Emil..... 30
Wagner, Matthew.....
Waldman, Mandel..... 10
Wales, Henry S..... 89
Warrington, Chester..... 30
Watson, Carl..... 73
Watson, William..... 59
Webber, Carl B..... 14
Weeks, Robert E..... 38
Weigle, George W..... 24
Wells, George H..... 56
Welsh, Donald.....30
Wheeler, Raymond F..... 45
Wheelock, Harold E..... 38
White, William A..... 14
White, William..... 37
Whitney, Gail D..... 73
Whittemore, Aubrey..... 66

Wilkinson, Charles F..... 48
Williams, Raymond G..... 62
Winne, John S..... 8
Winter, Albert H..... 82
Wittman, William F..... 46
Wolf, Henry..... 32
Wood, Clark C..... 16
Wray, Park O..... 46
Wyre, Donald G..... 45
Yates, Arthur..... 8
Zielaskowski, John..... 64
Zink, Otto..... 32
Zitzewitz, Walter..... 40

Unclassified Students.

Adams, Clyde L.
Aldous, Wildred.
Allured, Karl.
Anderson, M. Sigfried.
Baird, John P.
Barton, William H.
Bauerle, Walter E.
Bird, Samuel.
Byles, William J.
Colby, Claude.
Colver, Arthur.
Dana, Walter D.
David, Carl.
Davis, Uriah.
Dorzeski, Victor.
Duclos, Aeneas.
Dunlop, Samuel D.
DuShane, John.
Eikstaedt, Herman A.
Goedjen, Edward W.
Goodykoomtz, Wilmer.
Graves, William T.
Green, Irvin W.
Greenberg, Jacob.
Griffin, Cornelius.
Hess, Bryce M.
Hoadley, George L.
Holmes, Arthur W.
Hunter, Dundas.
Huth, Walter.
Jessup, John M.
Kilpatrick, George H.
Kobbervig, Henry.
Kubo, Tajie.
Lindgren, Arthur.
Mason, Fred T.
McDonald, C. Sumner.
Middleton, Dale.
Miller, Warren.
Naylor, Carl G.
Robbel, William G.
Robinson, Pratt.
Schwinn, Fred.
Serviss, John.
Smith, Harold C.
Streeter, Arthur E.
Sykes, Grover.
Trainor, Roscoe J. C.
Troeger, Harold B.
VanPlew, James W.
Vincer, John R.
Wiles, Edward W.
Wood, Edward H.
Wright, Fred T.
Wright, John A.

Summary of Attendance.

The School of Arts.

Associates in Arts	27
Candidates for the Title of Associate	118
Candidates for the Academic Certificate	326
Unclassified Students	80
Special and Summer Students	174
Students in Day Classes	725
Students in Evening Classes	458

The School of Engineering.

Candidates for the Degree of M. E.	91
Candidates for the Academic Certificate	327
Unclassified Students	55
Special and Summer Students	47
Students in Day Classes	520
Students in Evening Classes	594

Total Attendance.

Day Students in the Institute	1,245
Evening Students in the Institute	1,052
Total	2,297

TENTH ANNUAL REGISTER

OF THE

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DEVOTED TO

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WILLIAM H. HALL, BUSINESS MANAGER.

*Deceased.

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ALBERT G. LANE,
JOHN McLAREN,
ADDISON E. WELLS.

GEORGE N. CARMAN, DIRECTOR.
WILLIAM H. HALL, BUSINESS MANAGER.

*Deceased.

Calendar 1906-1907.

July 2, Monday—Summer Session begins.

Aug. 10, Friday—Summer Session ends.

Sept. 10-14, Monday to Friday—Final Examinations for Admission.

Sept. 17, Monday—Autumn Quarter begins for students who have not heretofore been in attendance at the Institute. Recitations for one week as a basis for permanent classification.

Sept. 24, Monday—Autumn Quarter begins for students who were in regular attendance during the year 1905-1906.

Oct. 1-5, Monday to Friday, Evenings—Registration and Classification of Candidates for admission to Evening classes.

Oct. 8, Monday—Evening Classes begin.

Nov. 29-30, Thursday and Friday—Thanksgiving Recess.

Dec. 18, Tuesday—Autumn Quarter Ends.

Holiday Recess for two weeks.

Jan. 2, Wednesday—Winter Quarter begins.

Feb. 22, Friday—Washington's Birthday—a Holiday.

March 22, Friday—Winter Quarter ends.

Quarterly Recess for one week.

April 1, Monday—Spring Quarter begins.

May 30, Thursday—Memorial Day—a Holiday.

June 15, 22, Saturdays, from 9 A. M. to 1 P. M.—Preliminary Examinations for Admission.

June 21, Friday—Spring Quarter ends.

FACULTY.

GEORGE NOBLE CARMAN, Director.

A. B., University of Michigan, 1881; A. M., *ibid.*, 1906; Principal, High School, Ypsilanti, Mich., 1880-82; Superintendent of Schools, Union City, Mich., 1882-85; Principal, Grammar School No. 15, Brooklyn, N. Y., 1885-89; Principal, High School, St. Paul, Minn., 1889-93; Dean of the Academy of the University of Chicago, Morgan Park, Ill., 1893-95.

*WILLIAM ALBERT GREESON, Professor of Mathematics, and Dean of the Faculty.

A. B. and A. M., University of Michigan, 1879; Principal, High School, Flint, Mich., 1879-81; Instructor, High School, Grand Rapids, Mich., 1881-85; Principal, High School, Grand Rapids, Mich., 1885-96.

EDWIN HERBERT LEWIS, Professor of English.

A. B., Alfred University, 1887; A. M., *ibid.*, 1887; Senior Teacher, Vice-Principal, High School, Plainfield, N. J., 1887-88 and 1889-90; Student in Italian libraries, 1888-89; Professor of Latin, Alfred University, 1890-92; Ph. D., Syracuse University, 1892; Fellow in English, University of Chicago, 1892-93; Assistant in Rhetoric, *ibid.*, 1892-94; Ph. D., University of Chicago, 1894; Instructor in Rhetoric, *ibid.*, 1894-96; Associate Professor, *ibid.*, 1896-99; Associate Professor, Lewis Institute, 1896-99; Litt. D., Milton College, 1905.

PAUL MELLEN CHAMBERLAIN, Professor of Mechanical Engineering.

B. S., Michigan Agricultural College, 1888; M. E., Cornell University, 1890; with Brown Hoisting and Conveying Machine Co., Cleveland, Ohio, 1889-90; Assistant Engineer with Frick Co., Waynesboro, Pa., 1890-92; Mechanical Engineer for Hercules Iron Works, 1892-93; Assistant Professor of Mechanical Engineering, Michigan Agricultural College, 1893-96; Assistant Professor of Mechanical Engineering, Lewis Institute, 1896-99; Member of American Society of Mechanical Engineers; Member of Western Society of Engineers.

CHARLES WESLEY MANN, Professor of History.

A. B., De Pauw University, 1887; A. M., *ibid.*, 1888; Instructor in Mathematics and French, De Vaux College, N. Y., 1887-88; Instructor in Mathematics, and Superintendent, Kenyon Military Academy, Gambier, Ohio, 1888-91; Associate Principal, Illinois Military Academy, Morgan Park, 1891-92; Dean of Chicago Academy, 1893-96; Assistant Professor of History, Lewis Institute, 1896-1900.

*Resigned.

PHILIP BELL WOODWORTH, Professor of Physics and Electrical Engineering.

B. S., Michigan Agricultural College, 1886; M. E. in Electrical Engineering, Cornell University, 1890; with Brush Electric Co., Cleveland, Ohio, 1889-90; Student in University of Berlin, 1891-92; Assistant Professor in charge of Physics and Electrical Engineering, Michigan Agricultural College, 1892-99; Assistant Professor of Physics and Electrical Engineering, Lewis Institute, 1899-1901; Member of American Institute of Electrical Engineers; Member of Western Society of Engineers.

CLARENCE ELBERT DEPUY, Professor of Mechanical Engineering and Shop Work.

B. S. in Mechanical Engineering, University of Michigan, 1891; in Machine Shop of Dennis Machine Co., Jackson, Mich., 1883-87; Instructor in Machine Shop, Chicago Manual Training School, 1891-96; Member of American Society of Mechanical Engineers.

ALEXANDER WILLETT MOSELEY, Professor of Applied Mechanics.

S. B., Massachusetts Institute of Technology, 1891; Draftsman, World's Columbia Exposition, Chicago, 1891-93; with Webster Mfg. Co., Chicago, 1894-95; Chief Draftsman, Atlanta Exposition, summer 1895; Instructor in Mechanical Engineering, Massachusetts Institute of Technology, 1895-99; with Wm. Sellers & Co., Philadelphia, 1899; Assistant Professor of Mechanical Engineering, Michigan Agricultural College, 1900; Member of American Society of Mechanical Engineers; Member of the Western Society of Engineers; Member of the American Society for Testing Materials.

WARREN RUFUS SMITH, Professor of Chemistry.

A. B., Bowdoin College, 1890; Ph. D., University of Chicago, 1894; Instructor in Science, Leicester Academy, Leicester, Mass., 1890-91; Scholar in Chemistry, Clark University, 1891-92; Fellow in Chemistry, University of Chicago, 1892-94; Assistant in Chemistry, Bowdoin College, 1894-95; Instructor in Science, High School, New Bedford, Mass., 1895-96; Instructor in Chemistry, Lewis Institute, 1896-1900; Fellow of American Association for the Advancement of Science; Member of American Chemical Society; Member of Society of Chemical Industry.

HERBERT EDGAR COBB, Professor of Mathematics.

A. B., Wesleyan University, 1887; A. M., *ibid.*, 1890; Instructor in Mathematics, Maine Wesleyan Seminary and Female College, 1887-90; Instructor in Mathematics, University of Colorado, 1890-92; Graduate Student in Mathematics and Lecturer in University Extension Division, University of Chicago, 1892-96; Instructor in Mathematics, Lewis Institute, 1896-99; Student, University of Berlin, 1905-06.

JAMES WALTER FERTIG, Assistant Professor of History.

A. B., University of Nashville, 1890; A. M., *ibid.*, 1891; Graduate Student in History, Vanderbilt University, 1891-92; Instructor in History and Mathematics, Montgomery Bell Academy, Nashville, 1891-93; Graduate Student in History and Political Science, University of Chicago, 1893-97; Fellow in History, *ibid.*, 1894-97; Lecturer in the Extension Department, *ibid.*, 1895-96; Ph. D., *ibid.*, 1897; Professor of History, University of Arkansas, 1898-99; Instructor in History, Lewis Institute, 1899-1902.

JOSEPH RALEIGH NELSON, Assistant Professor of Latin.

A. B., University of Michigan, 1894; Instructor of Latin, John Marshall High School, Chicago, 1894-1900; Instructor in Latin, Lewis Institute, 1900-02; Graduate Student in Latin, University of Michigan, 1902-03; A. M., University of Michigan, 1903.

FRED A. ROGERS, Assistant Professor of Physics and Electrical Engineering.

B. S., in Electrical Engineering, University of Michigan, 1894; Electrical Engineer for Vermillion Milling and Electric Co., Vermillion, S. D., 1895-96; Assistant in Physics, Lewis Institute, 1896-97; Instructor in Physics and Electrical Engineering, *ibid.*, 1897-1902; Member of Western Society of Engineers; Associate Member of American Institute of Electrical Engineers.

JESSIE LOUISE JONES, Assistant Professor of German.

A. B., Doane College, 1884; Graduate Student, University of Michigan, 1894-95; Student in Berlin and Paris, 1888-90; Teacher, Jacksonville Female Academy, 1890-93; Teacher of German, Chicago Preparatory School, 1893-94; Teacher of German, Chicago Female College, 1894-95; Fellow, University of Chicago, 1895-96; Ph. D., *ibid.*, 1897.

GEORGE LEE TENNEY, Assistant Professor of Latin.

A. B., Denver University, 1894; Principal, High School, Manitou, Colo., 1894-96; Instructor in Latin, Denver Manual Training High School, 1896-99; Graduate Student in Latin, University of Chicago, 1899-1900; A. M., University of Denver, 1900; Instructor in Latin, Denver Manual Training High School, 1900-02; Instructor in Latin, Lewis Institute, 1902-03.

DUANE STUDLEY, Assistant Professor of Mathematics.

B. S., Cornell University, 1881; Principal, School, Corfu, N. Y., 1881-82; Instructor, High School, Cleveland, Ohio, 1882-86; Graduate Student, Cornell University, 1886-87; Instructor in Mathematics and Astronomy, *ibid.*, 1887-92; Professor of Mathematics, Wabash College, 1892-1901; Professor of Mathematics, Kalamazoo College, 1901-03.

CHARLES EMERSON PEET, Assistant Professor of Physiography.

B. S., University of Wisconsin, 1892; Fellow in Geology, University of Chicago, 1892-95; Assistant, New Jersey Geological Survey, 1891-95; Assistant, U. S. Geological Survey, 1895-97; Instructor in Geology and Physical Geography, Englewood High School, 1897-99; Instructor in Physiography, Lewis Institute, 1899-1905.

PHILEMON BULKLEY KOHLSAAT, Assistant Professor of English.

Ph. B., University of Chicago, 1894; Teacher, Chicago Heights High School, 1894-95; Instructor in Latin, Chicago Academy, 1895-96; Fellow in English, University of Chicago, 1897-99; Instructor in English, Lewis Institute, 1896-97 and 1899-1905.

LEWIS GUSTAFSON, Assistant Professor of English, and Registrar.

A. B., University of Chicago, 1900; Assistant in English, Lewis Institute, 1897-1900; Instructor in English, *ibid.*, 1900-05.

BERKELEY JOHN THOMAS, Assistant Professor of Mathematics.

A. B., Emory and Henry College, Va., 1887; B. S., Fountain City Normal College, Tenn., 1888; Principal, High School, Spencer, Ky., 1888-91; Scholastic Fellow, Vanderbilt University, 1891-92; A. M., *ibid.*, 1892; Professor of Mathematics, Wofford College, S. C., 1892-95; Associate Professor of Mathematics, Armour Institute of Technology, 1895-99; Graduate Student, University of Chicago, and Lecturer in Mathematics in the Extension Division, 1899-1901; Teacher of Mathematics in the South Side Academy, and Assistant Principal, Teachers' Review School, Chicago, 1901-02; Head Teacher of Mathematics, Oak Park High School, 1902-05.

JOHN DEBK NIES, Assistant Professor of Physics and Electrical Engineering.

B. S., Michigan Agricultural College, 1894; with Municipal Lighting Plant, Holland, Mich., 1894-1901; Student, Cornell University, 1900; Instructor in Physics and Electrical Engineering, Lewis Institute, 1901-06; Member of American Institute of Electrical Engineers.

HELEN DOUGAL STREET, Assistant Professor of Greek and Latin.

A. B., University of Wisconsin, 1876; A. M., *ibid.*, 1879; Instructor, High School, Madison, Wis., 1877-81; Instructor in Latin, University of Wisconsin, 1883-84; Instructor in Greek and Latin, Lewis Institute, 1896-1906.

LEA RACHEL DELAGNEAU, Instructor in French.

Instructor in French, Chautauqua, N. Y., 1887-92; Instructor in French, Morgan Park Academy, 1893-95; Instructor in French and History, High School, Ottawa, Ill., 1888-96.

LOUIS EDWARD POPE, Instructor in Mathematics and Accounting.

Accountant for Bayfield Brownstone Co. and R. D. Pike, Wholesale Lumber, Bayfield, Wis., 1886-91; Instructor in Arithmetic and Bookkeeping, High School, St. Paul, Minn., 1891-96.

GEORGE ALEXANDER ROSS, Instructor in Woodwork.

Instructor in Woodwork, Chicago Manual Training School, 1890-93; Instructor in Woodwork, Jewish Training School, Chicago, 1893-98.

CHARLES EDGAR HOYT, Instructor in Foundry Work.

Instructor in Foundry Work and Pattern Making, Michigan Agricultural College, 1894-98; with Walker Manufacturing Company, Cleveland, Ohio, summer of 1897.

EDWARD BURTON DE GROOT, Instructor in Physical Culture.

Physical Director, Montclair Military Academy, 1891-97; Special Instructor, Harvard University Summer School of Physical Training, 1897; Student, Medical College of Virginia, 1897-98; Instructor in Physical Culture, Lewis Institute, 1899-1904; Superintendent of Gymnasiums, etc., for South Park Commission, 1904-05.

MARIE ELSA BLANKE, Instructor in Freehand Drawing.

Graduate of the Art Institute, Chicago.

JOHN LORD BACON, Instructor in Forge Work.

Graduate of Chicago Manual Training School, 1896; with Illinois Steel Co., 1896; with Marine Iron Works, 1896-98; Junior Member of American Society of Mechanical Engineers.

*JULIA DUMKE PEET, Instructor in German.

Ph. B., University of Chicago, 1898; Student, University of Berlin, 1897-98; Assistant Principal, High School, Belle Plaine, Iowa, 1891-93.

DIC HECTOR TROWBRIDGE, Instructor in Chemistry.

B. S., University of Michigan, 1898; Instructor, High School, Adrian, Mich., 1898-99; Assistant in Chemistry, University of Michigan, summers, 1899-1900.

CHARLES SCHENCK, JR., Instructor in Mechanical Drawing.

Student, University of Illinois, 1896-98; Draftsman with Troy Laundry Machinery Co., 1898-99; with W. S. McKinney, Mechanical Engineer, 1899; with Chicago Union Traction Co., Engineering Department, 1899-1901; with Purdy & Henderson, Civil Engineers, 1901; Junior Member of American Society of Mechanical Engineers.

*EDWARD HERMAN LAY, Instructor in Mathematics.

A. B., Yale University, 1894; Instructor in Mathematics, West Jersey Academy, 1895-96; New York Military Academy, 1896-97; Buckley High School, 1897-98; Graduate Student, University of Chicago, 1898-99; Principal, Buchanan College, Troy, Mo., 1899-1900.

ANNA FORSTER, Instructor in German and French.

Graduate of Royal Seminary, Breslau, Germany, 1872; Instructor in German and French, Hillside School, Wisconsin, 1896-98.

WILLIAM PARKER HAWLEY, Instructor in Mechanical Drawing.

B. S., Michigan Agricultural College, 1892; Student, Cornell University, summer, 1899; Machinist with Troy Laundry Machinery Co., 1895-96; Draftsman with Coe Typesetting Machine Co., 1896-98; Teacher of Manual Training, Chicago Public Schools, 1898-1901; Draftsman, Ordnance Office, Washington, D. C., 1901; Junior Member of American Society of Mechanical Engineers.

MARY MOULTON SMITH, Instructor in Domestic Economy.

Graduate of Gannett Institute, Boston, 1888; Associate in Science, Lewis Institute, 1902.

JESSE MYRON OWEN, Instructor in English.

Ph. B., Iowa College, 1900; Instructor in English, French, and German, High School, Ashland, Ky., 1900-01; Instructor in English and History, Drury College Academy, 1901-02.

*KATE BELLE MILLER, Instructor in English.

Ph. B., University of Chicago, 1902.

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*Absent on leave, 1906-07.

HERBERT MERRILL WHEELER, Instructor in Mathematics and Engineering.
B. E. E., University of Minnesota, 1896; with Fort Wayne Electric Works, 1896-98; with Engineering Department of Chicago Union Traction Company, 1898-1903; Junior Member of Western Society of Engineers; Associate Member of National Associatoin of Stationary Engineers.

ETHEL PERCY ANDRUS, Instructor in English.
Associate in Literature, Lewis Institute, 1902; Ph. B., University of Chicago, 1903.

JOSEPH EDWARD HORA, Instructor in Chemistry.
Associate in Science, Lewis Institute, 1902; B. S., University of Chicago, 1903; Assistant in Chemistry, *ibid.*, Summer, 1904.

GEORGE PLIMPTON ADAMS, Instructor in Philosophy and Biology.
A. B., Harvard University, 1903; Student, Chicago Theological Seminary and University of Chicago, 1903-04.

KATHARINE I. INGERSOLL, Instructor in Domestic Economy.
Student at Oberlin College, 1887-89; Teacher, Denver Public Schools, 1893-1903.

ABIGAIL FLORENCE WILLIAMS, Instructor in English.
B. L., Northwestern University, 1901; M. L., *ibid.*, 1902; Instructor in English, Joliet High School, 1902-03; Professor of English Literature, Missouri Valley College, 1903-04.

MARY KNOWLES WOODLE, Instructor in English.
Graduate of Kirkland School for Women, Chicago, 1898; Graduate of Chicago Normal School, 1899; Cadet, Chicago Normal School, 1899-1900; Teacher, Andrew Jackson School, Chicago, 1900-03.

HORACE B. MCCABE, Instructor in Mechanical Drawing and Machine Shop Work.
Student, Colorado Agricultural College, 1891-92; Apprentice and Toolmaker, 1892-99; Draftsman with Parish & Bingham Co., 1899-1900; Instrument Maker with William Gaertner & Co., 1900-01; Machine Shop Foreman with Submerged Electric Motor Co., 1901-04.

MINNA CAROLINE DENTON, Instructor in Biological Sciences.
B. S., University of Michigan, 1900; A. M., *ibid.*, 1901; Assistant in Biological Laboratory, *ibid.*, 1900-01; Instructor in Biological Sciences, Milwaukee-Downer College and Home Economics Training School, 1901-06.

MABEL THACHER WELLMAN, Instructor in Domestic Economy.
A. B., Wellesley College, 1895; Teacher, Brookline Schools, 1895-1900; Teacher and Student, Domestic Science Department, Chautauqua Summer School, 1899-1902; Student, Massachusetts Institute of Technology, 1897, 1898, 1902, Bussey Institution, 1901; Instructor in Chemistry and Home Economics, Rockford College, 1902-1906.

FREDERICK ERNEST BECKMANN, Instructor in Modern Languages.
A. B., University of Chicago, 1897; Ph. D., *ibid.*, 1900; Instructor in Romance Languages, University of Minnesota, 1899-1904; Oberlehrer, Allgemeine Deutsche Schule, Antwerp, Belgium, 1904-06.

EMILIE A. FLINTERMANN, Instructor in German.
Ph. B., University of Michigan, 1898; Instructor in German and Latin, High School, Ishpeming, Mich., 1898-99; Preceptress in German and English, High School, Ypsilanti, Mich., 1899-1900; Instructor in German, Mount Holyoke College, 1900-1906.

Assistants and Other Officers.

GORDON ABBOTT, B. S., Mechanical Drawing.
ALEXANDER D. BAILEY, M. E., Mechanical Drawing.
FANNIE B. BLISS, German.
CHARLES BORG, Physics.
AGNES BROWN, Cookery.
L. C. COLLAR, B. S., Physics.
FLORENCE DAVIDSON, Domestic Economy.
ANNA E. DRUMMOND, A. B., English.
ORRA M. S. FOOTE, Sewing.
HARRY N. GILBERT, Clerk.
NELLE GILL, Mathematics.
WARREN S. GORDIS, Ph. D., Latin.
FREDERICK L. HAVENS, Machine Shop Work.
OCIE M. HAZZARD, Cookery.
NOBLE S. HEANEY, A. B., Latin.
JANE HEAP, Drawing.
CHARLES F. HENNING, M. E., Mechanical Drawing.
WILLIAM G. HOF, M. E., Mechanical Drawing.
CHARLES P. HULBURD, Mechanician and Curator.
J. VINCENT HUNTER, Chemistry.
JAY S. JACKSON, A. B., English.
JOHN M. JESSUP, Physics.
W. BRADFORD JONES, B. S., Physics.
MARY KANE, Physical Culture.
WILLIAM M. KINNEY, M. E., Wood Work.
F. HOWARD LANE, M. E. Physics.
J. HERBERT LIBBERTON, Physics.
LOIS MARTIN, Sewing.
OLIVER MOJONNIER, Stenographer.
GEORGE R. MOORE, Clerk.
HAROLD H. MORGAN, M. E., Mathematics.
LOUIS OMER, A. B., Mathematics.
INA K. PITNER, Millinery.
WILLIAM C. PUSEY, Chemistry.
FRANK RICH, Mechanical Drawing.
HAROLD ROBBINS, Mechanical Drawing.
MARGUERITE ROESCHLAUB, Sewing.
IDA SERVEN, Public Speaking.

J. P. SHAW, Accounting.
JOHN C. SOUTH, M. S., Mathematics.
DON FERNANDO STAUD Y XIMENES, M. E., Spanish.
HELEN A. SULLIVAN, Mathematics.
FRANCES TALCOTT, Librarian.
VICTOR THELIN, Physics.
JOHN A. TUCK, Ph. B., Mathematics.
WILLIAM A. WALTERS, English.
HAROLD P. WEAVER, M. E., Mechanical Drawing.
EDWARD L. WHEELER, Athletic Coach.
ALBERT H. WINTER, Wood Work.
E. C. WINTERS, Penmanship.

Historical Sketch

The Lewis Institute owes its existence to the late Allen C. Lewis, who, by his will, which was admitted to record November 1, 1877, left a large part of his estate for the support of the Institute, and provided for its organization. Articles of incorporation for the Institute thus projected were granted by the Secretary of the State of Illinois, July 9, 1895.

James M. Adsit, Henry F. Lewis, and Hugh A. White were named in the will as the first trustees of the estate, the estimated value of which in 1877 was five hundred and fifty thousand dollars. Credit is due to these trustees, and especially to Hugh A. White, for such efficient management that the estate amounted, when turned over to the trustees of the Lewis Institute, November 21, 1895, to one million six hundred thousand dollars.

John A. Roche, Christian C. Kohlsaat, and John McLaren, under whom the Institute was incorporated, constituted the board of trustees from May 28, 1894, until the completion of the first buildings. The sites previously chosen having proved unsuitable, the trustees selected and purchased, at an expense of one hundred and sixty-nine thousand dollars, the principal portion of the block extending from Monroe street to Madison, between Winchester avenue and Robey street. This site is centrally located in the West Division of Chicago, and is easily accessible from all parts of the city by means of several lines of surface cars, and the Lake street and the Metropolitan elevated roads.

The erection of the first buildings was commenced in May, 1895. The Institute was opened in September, 1896.

Organization and Scope of Work

Organization.

The Institute is a polytechnic school for both sexes. Instruction is given in general and technical studies covering the usual college and high school periods. The courses of instruction are grouped into three main divisions:

1. Engineering and the Mechanic Arts.
2. General Science, including Domestic Economy.
3. The Liberal Arts.

The courses of instruction in wood, pattern, foundry, forge, and machine shops, together with those in drawing, design, sketching, applied mathematics, and electrical and mechanical engineering laboratories, are outlined under "Engineering and Mechanic Arts," pages 30 to 36. The aim is so to present these subjects that the student may secure a systematic training in applied science second to none in thoroughness and efficiency, leading to the degree of Mechanical Engineer. Persons who intend to follow a trade allied to engineering may pursue such special courses as are recommended after consultation with the Director. The instruction given at night furnishes similar opportunities to those who are occupied during the day.

The courses in mathematics, physics, chemistry, and biology are calculated to meet the needs of those who are making preparation for work in engineering and domestic economy. They are, however, equally well adapted to the demands of students in general science. Courses in English and foreign languages and literatures, history and political economy, psychology and ethics are provided by the Institute in recognition of the fact that the basis of successful engineering study must be broad and solid, and candidates for the engineering degree are encouraged to secure as complete a general education as time and means will permit. Many high school graduates, not candidates for the degree of Mechanical Engineer, have continued their education in the Institute by tak-

ing advantage of the courses of instruction offered in Science and the Liberal Arts. To these students the Title of Associate in Arts is granted on the completion of two years of college work.

To those students who complete only the four years of high school the Academic Certificate is granted.

The high school and college requirements for the degree of Mechanical Engineer and for the title of Associate in Arts are given on page 17, and the requirements for the Academic Certificate on page 18.

It is the purpose of the Institute to do as much as possible for every individual student, considering the time and money at his command. The greatest service it can render the man of small means is to save his time without sacrificing educational essentials. By careful correlation of work and by methods of individual instruction the Institute has been fortunate in accomplishing this end. For example, students of good ability entering the high school at the age of fourteen have been graduated as Mechanical Engineers at twenty-one. This is a saving of at least two years over customary curricula, and is accomplished by having the student in one atmosphere for the seven most important years of his intellectual life.

Requirements for Admission.

Candidates for the degree of Mechanical Engineer or for the title of Associate are admitted upon presentation of certificates of graduation from Chicago high schools or schools of equal rank and are assigned to classes upon the basis of these certificates. Their standing, however, is regarded as probationary until confirmed by examination. The examinations are held during the first week of each school year, and take the form of recitations, oral and written, which determine the candidate's fitness to continue the work in the classes to which he has been assigned. The Institute reserves the right to revise such standing if it should appear that the student needs more time for preparation in any given subject.

Candidates for the Academic Certificate are admitted upon presentation of certificates of graduation from Chicago grammar schools or schools of equal rank.

Candidates for advanced standing, whether of college or of high school grade, are admitted upon presentation of certificates of work done from the schools in which they have rereceived their previous training, and are assigned to classes upon the basis of these certificates subject to the conditions mentioned above.

Other candidates whose maturity and experience seem to warrant the assumption that they are in a position to profit by connection with the Institute may be admitted probationally without entrance examination.

Candidates for admission other than those mentioned above will be examined in such subjects as are prerequisites for the studies which they wish to pursue.* In all cases the test will call for intelligence rather than for technical knowledge.

Assignment of Studies.

A student on entering the Institute is assigned to such studies as seem to be best suited to his individual aims and needs as far as these can be determined from personal consultation and from an examination of the records of work done elsewhere. This assignment is made for a term of three months and is revised each quarter in the light of the work of the preceding quarter. The progress a student makes depends on his own ability and application, and is quite independent of what others are doing.

Courses of Instruction and Credits.

Unless otherwise specified a course of instruction continues for twelve weeks with five fifty-minute periods of class work, each week.

The unit of credit is sixty hours.

*For example, candidates for entrance into the first year of high school will be examined on English, arithmetic, history of the United States, and geography as taught in the Chicago grammar schools.

The satisfactory completion of a course of instruction which requires 120 hours, counting time of preparation and recitation, or time devoted to laboratory, drawing, or shop work, entitles the student to two credits; 180 hours to three credits.

The number of periods of class work required daily and the number of credits assigned to each course of instruction are shown on pages 60 and 61.

In the Announcements, pages 30-58, the figures in parentheses indicate the number of credits given for each course.

The Degree of Mechanical Engineer.

In the Suggested High School Curriculum in preparation for the Degree of Mechanical Engineer the absolute requirements are in heavy type and consist of 3 years of work in English (21 credits), 3 in mathematics (21 credits), 1 in history (9 credits), 1 in physics (9 credits), and 4 in shop work and drawing (24 credits). Of the 4 years of elective work, at least 3 must be in foreign languages. High school graduates who have had no shop work and drawing will find it convenient to make up deficiencies by attending the Institute in the summer.

Most of the College Requirements are absolute (as shown in the curriculum), but there are such electives in the last two years as enable the student to specialize in shop, steam, electrical, or chemical engineering.

The Title of Associate in Arts.

To obtain the Title of Associate in Arts the student must secure 144 credits, of which 72 are prescribed as follows: English 24, mathematics 18, foreign languages, or engineering, or domestic economy 18, history 6, physics or chemistry 6; leaving 72 credits to be selected according to the varying needs of different students.

The Academic Certificate.

To obtain the Academic Certificate the student must receive 90 credits, of which 45 are prescribed as follows: English 21, algebra and geometry 12, foreign language or engineering 12. The remaining 45 credits are not elected by students, but are arranged for and planned with them with the view of helping them to make the best use of their time and talents and opportunities.

Tuition.

The rates of tuition for day students are ten dollars a quarter for one course of instruction, and twenty dollars for two or more courses.

The rates for night students are five dollars for a term of ten weeks for one course of instruction, two evenings a week, and ten dollars for two courses, four evenings a week.

For definition of course of instruction see page 16.

Fees.

Day students are required to pay a registration fee of five dollars.

Both day and night students who take one or more shop or laboratory courses in the departments of physics, chemistry, and engineering are required to pay a fee of five dollars a quarter.

Students in chemistry deposit two dollars each to cover breakage. If the charges do not amount to two dollars, the excess is returned to the student.

Scholarships.

Three scholarships, each amounting to one year's tuition, have been established under the will of the late Mrs. Hugh A. White. Mr. John McLaren was named in the will to assign these scholarships.

Three additional scholarships, amounting respectively to

one, two, and three quarters' tuition, are assigned by the Institute for excellence in public speaking. These scholarships are assigned in the fourth year of high school and are available in the first year of college.

Standings and Reports.

At the end of the quarter reports are sent to parents or guardians showing the standings of students in the courses of instruction pursued. These standings are based on daily work and quarterly examinations. The parents of students who are not doing satisfactory work are notified in the middle of the quarter, and their co-operation is secured, when possible, through personal interviews.

Attendance and Discipline.

Prompt and regular attendance is expected of all students. When such attendance cannot be secured, and when it becomes apparent that the student is not profiting by his connection with the Institute, his parents or guardians will be given an opportunity of withdrawing him; if he is not withdrawn within a reasonable time, he will be dismissed.

Student Organizations.

There are numerous student organizations in the Institute, but all include some member or members of the faculty who act as sponsors for them. In addition to the social life thus provided, these societies afford chances for improvement in music, dramatic art, the study of classical antiquity, the conversational use of foreign languages, and special topics in engineering.

Half-Day and Evening Courses.

Many boys and girls are obliged to leave school in order to take care of themselves and those dependent upon them, at a time when their more fortunate associates enter upon such

courses of instruction as are herein outlined. Such as can attend the Institute but half of each day may, by prolonging the time requirement, complete the work of some one group of studies, or at least perfect themselves in one or more subjects. Provision has also been made for such instruction at night as enables young men and women who are employed during the entire day to continue their education along those lines which will be of the most service to them in the work in which they are engaged. In point of numbers of students and benefits derived by them no work of the Institute is more important. For schedule of classes see pages 64-83.

The Buildings and Their Appointments.

The buildings are fire-proof structures of brick, sandstone, terra-cotta, and steel, and have been erected at a cost of four hundred thousand dollars for buildings, and one hundred and fifty thousand dollars for equipment.

The Arts Building, at the corner of Madison and Robey streets, is a six-story structure; the Engineering Building, on Robey street, has seven stories; and the Gymnasium, in the rear of the other buildings, has two stories. A high, well-lighted basement occupies the entire space covered by all the buildings and the alleys which separate them.

Both the Engineering and the Arts Buildings are supplied with elevators and the most approved appliances for heating and ventilation, and are equipped with all apparatus needed for the successful accomplishment of the work that has been undertaken.

The Library.

The library consists of thirteen thousand volumes, selected with immediate reference to the needs of each department. It is essentially a working library, containing all necessary reference works, together with representative books in the various sections of history, biography, literature, fine arts, engineering, mathematics, philology, and sociology. There

are special libraries connected with the class-rooms in physics, chemistry, and history. One hundred and sixty-three periodicals are currently received.

Throughout the school year the library is open from eight A. M. to five-thirty P. M.; during the session of the night school the hour for closing is nine-thirty P. M. The students at all times have free access to the shelves. Library assistants serve in turn at the reference desk and assist in making the students familiar with the arrangement of the books and the use of the dictionary catalogue. It has been attempted to make the catalogue a clear, simple guide to the resources of the library and to keep it free from confusing technicalities. The Dewey system of classification is used, with Cutter book numbers.

Laboratories.

The *Geographical and Geological Laboratory* equipment includes the following: A nearly complete set of the topographical atlas sheets of the United States Geological Survey; United States Coast and Geodetic Survey charts and Geological folios; Mississippi and Missouri river charts; pilot charts of the Atlantic and Pacific oceans; weather maps and charts; relief globe of the earth; relief maps of the continents; relief maps of the United States and of selected localities; collections of common rocks and minerals; several hundred lantern slides; Laing's planitarium, Morse's heliodon, and a four-inch refracting telescope; tables and facilities for molding topographical features; books of reference.

The rooms assigned to the *Department of Chemistry* occupy the west end of the fifth floor. They include lecture-room, departmental library, general laboratory, analytical laboratory, organic laboratory, balance room, and store room. The lecture room has a seating capacity of three hundred. The laboratories are furnished with convenient desks, supplied with water and gas. In each laboratory there is a liberal number of hoods, each of which is exhausted by an electric

fan. The store room is supplied with all the apparatus needed for the courses as outlined. It also contains a full list of chemicals, both organic and inorganic, including a set of specimens of the most important naturally occurring compounds of each element. The balance room is provided with Sartorius analytical balances. The departmental library includes the best English, German, and French reference works, and the current English and American periodicals.

The east end of the fifth and sixth floors is used for the work in *Domestic Economy*. It contains a lunch room and a kitchen, a cooking laboratory, and recitation rooms.

The *Lunch Room* is large, airy, and in every way attractive. Lunch is prepared in the Institute kitchen, under the direction of the instructor in domestic economy. The bill of fare always includes soup, milk, chocolate, sandwiches, fruit, and a warm dish, such as meat-pie or baked beans, and usually a salad and a light dessert. Students who bring their lunches from home are permitted to use the lunch room tables. They may, if they desire, supplement their lunches with articles from the bill of fare.

Next to the lunch room is the *Cooking Laboratory*. This has accommodations for sixteen students, with every facility for individual work.

The work in *Sewing and Millinery* is carried on in ample quarters in the sixth story, with overhead light.

The *Department of Physics* has an especially equipped lecture room with steopticon, hydraulic lift, pressure gauges, vacuum gauges, electrical instruments, and recording hygrometer. The lecture table is provided with water, compressed air, steam, and Chapman pump for producing vacuum. The rooms for the use of the department are: general physics laboratory, departmental library, apparatus and preparation room, photometric rooms, private workroom, advanced laboratory, electrical measurements room, and photographic rooms. In the advanced physics laboratory each table is provided with four slate-lined fuse boxes, from which different

currents for use in testing may be obtained. The reference library is supplied with a large assortment of books on the subjects of Physics and Electricity. The photometric room is equipped with a Lummer-Brodhun photometer and standard lamps.

The workroom is in charge of a competent mechanician, and is equipped with an eight-inch Rivett precision lathe, with attachments for milling, grinding, and screw-cutting, a Walker grinder, and numerous hand tools.

The laboratories are fully equipped with apparatus for quantitative work in general physics and electricity. Some of the more recent additions to the outfit for work in light are the following: A Schmidt and Haensch spectrometer, a Schmidt and Haensch polariscope, a Michelson interferometer, and a Newton lecture-room polariscope.

The electrical equipment consists of standards of resistance, capacity, self-induction, and electromotive force; resistance boxes, bridges, galvanometers, and lectrometers from Nalder Brothers & Co., Elliott Brothers, and Hartmann & Braun; also dynamometers and Weston & Whitney voltmeters, and ammeters of various types and ranges. A twelve-inch induction coil furnishes an important part of the equipment. Specially designed switch-boards are located in the general physics laboratory and in the advanced laboratory. The latter is equipped with Weston voltmeters and ammeters and an automatic circuit breaker.

The apparatus in the engineering laboratories is also available for use in the department of physics.

The Shops and Engineering Laboratories.

The *Foundry,* on the sixth floor of the engineering building, is well lighted from skylights in the roof and by windows in the side and end.

The molding floor is made of cedar block placed on end; the floor around the cupola and furnaces is of brick. There are places for sixteen students, each place having a molding floor and a bench, and each bench an equipment of shovel, riddles, rammers, bellows, and molders' small tools.

There is a well equipped core room with two core ovens, one heated by gas for small cores, and the other, 6 feet wide by 10 feet long by 7 feet high, heated by coke and equipped with a car 4 feet wide by 6 feet long. A track for the car runs under the crane for handling large cores and dry-sand molds. There are two permanent and two portable brass furnaces with a combined capacity of 800 pounds, and two cupolas, one a 16-inch, hung on trunions, and the other, a 24-inch, standing on the floor. A one-ton 16-foot traveling crane with electric hoist covers the main floor of the foundry.

The equipment includes a cleaning room with tumbling barrel and a flask and pattern shop with 12-inch wood lathe. The machinery is driven by a 5-horse-power motor.

A class room and office open off the foundry. A pattern storage 20 feet by 60 feet opens off the charging platform. All the equipment except motors and fan was built in the Institute shops.

The *Pattern Shop* on the fifth floor is arranged to accommodate classes of sixteen at a time. It is equipped with eight double benches, each side of a bench having a locker in which the tools used by the students in general are kept, and four locked drawers in which are kept the edged tools used by individual students. The machines in the pattern shop are one 24-inch 12-foot, and three 16-inch 6-foot overhanding spindle lathes; two 12-inch 5-foot, and two 11-inch 4 1-2-foot speed lathes; one 26-inch surface planer; one universal circular cut off and rip saw; one 36-inch band saw; one grindstone; one emery tool grinder; and one trimmer. The band and circular saws and the planer are driven by individual electric motors. The lathes are driven from two line shafts, each of which has independent motors.

Special tools and supplies are kept in the tool room, and tools are issued to students on check. Conveniently located are a dry kiln and a room in which unfinished work is kept. The wash room opens off the shop and is fitted with individual lockers. The office and class room is arranged for class in-

struction and is equipped with all necessary appliances.

The *Elementary Woodshop* is located at the north end of the fifth floor and is arranged to accommodate four classes of eighteen each. This shop is for hand work only. The benches are similar to those in the pattern shop, and are equipped with all proper tools. Seats are arranged so that students can have class instruction by practical demonstration and by lectures in which the stereopticon is used.

Special tools and supplies are kept in the tool room. The locker room is arranged with individual lockers.

The *Wood Turning Shop* is located between the elementary wood shop and the pattern shop, and is equipped with eighteen lathes of different sizes and makes and requisite tools and appliances. The lathes are driven by a ten horse power motor. Lockers in which work is kept are arranged along one side of the shop. The locker and wash room opens off the shop.

The *Machine Shop* is on the fourth floor and occupies two separate rooms. The shop at the north end of the building is for elementary machine work, and the south shop for advanced work. Between the two shops and communicating with both is the tool and stock room, where all small tools and supplies are kept.

The equipment of the elementary shop consists of one 12-inch 5-foot plain engine lathe; one 12-inch 5-foot engine lathe with draw chucks, taper attachment, and compound rest; two 14-inch 6-foot and one 15-inch 6-foot engine lathes, with taper attachments and compound rests; six 14-inch 6-foot plain engine lathes; two 12-inch 4-foot speed lathes; one 15-inch friction geared shaper; one 16-inch crank shaper; one plain miller, with index centers; one 18-inch drill press; one double-wet emery tool grinder; and sixteen vises, placed on a bench running along two sides of the shop. Near the entrance stands a case of small lockers in which the students keep their work and individual tools. The machines in this room are driven by a ten horse-power electric motor attached to the ceiling.

The Machine Shop for advanced work is equipped with one 18-inch 12-foot engine lathe, with compound rest; one 16-inch 8-foot, and one 15-inch 6-foot engine lathe, with taper attachments; one 16-inch 8-foot engine lathe, with taper attachment and compound rest; one 14-inch 6-foot toolmakers' lathe, with taper and backing off attachments, compound rest, and draw chucks; one 14-inch 6-foot engine lathe, with taper attachment and compound rest; one 14-inch 6-foot plain engine lathe; one 12-inch 4-foot speed lathe; one No. 3 back geared screw machine, with wire feed; one No. 2 universal miller, with slotting and rack cutting attachments; one No. 3 universal miller, with universal vertical and circular attachments; one 12-inch by 30-inch universal grinder; one 26-inch rack shaper; one 24-inch by 24-inch by 6-foot planer; one 24-inch back-geared drill press; one 13-inch sensitive drill press; one No. 3 inclinable punching press; one combination emery wheel and disc grinder; one wet emery tool grinder; one universal cutter grinder; one circular cut-off saw; eight vises placed on wood benches along the walls on two sides of the shop, and three vises on iron benches on the erecting floor and among the machines. All the machines in this shop are driven by independent direct current electric motors, so connected as to give the necessary variation in speed for the tools. A one-ton 16-foot hand-power traveling crane, mounted in the center of the shop so that it can traverse the whole width of the building, provides for the handling of heavy work and parts of the machines and tools. In the tool room are kept the general tools and cutter holders belonging to the machines, all the small tools, scales, standard gauges, measuring instruments, supplies, and general stock used in the work of the shops. The tool room is in charge of an attendant, who, by means of the check system, issues tools to students as they are needed in the work. A class room and an office open off the shop.

The *Electrical Engineering Laboratory* is on the third floor of the engineering building. Its function is to supplement the work of lecture and class rooms. The apparatus is commercial rather than special, and represents the most recent

practice. The equipment includes one 33 K. W. direct current motor, used for driving line shafting; sixteen direct current motors, 5 K. W. and smaller; one 35 light arc dynamo; one 5 K. W. two phase alternator; one 6 K. W. two phase rotary converter; one 5 K. W. two and three phase rotary converter; one 7 1-2 K. W. double current generator, two and three phase and direct current; one 2 1-2 K. W. rotary converter for electrolytic work and welding, converting from 110 volts direct current to 8 volts direct current and 110 volts two and three phase alternating currents; two 2 H. P. single phase induction motors; one 3 H. P. three phase induction motor; one 5 H. P. three phase variable speed induction motor with three phase secondary mounted on a cradle dynamometer, and available as an induction motor, generator, or regulator, as a three phase stationary transformer, or as a frequency changer; four 2 1-2 K. W. transformers with 2 to 3 or 3 to 2 phase connections; four 5 K. W. transformers with a wide range of voltages; one 7 1-2 K. W. welding transformer; one 5 K. W. 30,000 volt testing transformer with instruments; one constant current series arc transformer with lamps; one constant current arc regulator; apparatus for transforming from constant pressure to constant current; one condenser compensator; one 10 K. W. integrating polyphase wattmeter; artificial transmission lines, a large number of indicating instruments, resistances, reactances, etc.

The *Mechanical Laboratory* is located on the second floor and covers a floor space of fifty by sixty feet. The apparatus in this laboratory is concerned largely with mechanical transmission, efficiencies, and testing of instruments. In the equipment are various forms of transmission and absorption dynamometers, belt testing machine, Reeves variable speed counter shaft, steam engine indicator spring tester, fifty foot mercury column, deadweight oil gauge testers, lubricating oil testers, LeChatelier pyrometer, smoke analysis apparatus, various forms of coal calorimeters, standard weights and thermometers. The motive power of this room is supplied by a 20 H. P. electric motor hung on a cradle dynamometer.

The *Strength of Materials Laboratory* occupies one-half of the first floor of the engineering building. It has an area of 3,000 square feet. The laboratory has equipment for testing steel and other metals, timber, cement, etc. The principal machines installed are: A 200,000 pound Olsen, a 40,000 pound Riehle, a 1 1-4 inch by 4 foot Olsen torsion, a dynamograph for finding the machinability of materials, a Keep dead load, and a Keep impact for cast iron, and a 2,000 pound Fairbanks cement tester.

The *Steam Laboratory* is in the northwest corner of the basement of the main building, and covers about 5,000 square feet of floor space. It is fitted for a great variety of work in compressed air, ammonia, and steam. Included in its equipment are a 30 H. P. return flue boiler, arranged for natural or induced draft; a vertical pipe smoke economizer; a 7 by 12 straight line engine, capable of attachment to an Alden water brake, as well as the ordinary forms of brake; an experimental engine, arranged to take various forms of valve, easily changeable; a gas engine, capable of many adjustments and arranged with gas and air meters; a surface condenser with necessary weighing tanks; an air and ammonia compressor in connection with a half-ton refrigerating system; air tanks capable of withstanding 1,200 pounds pressure; five forms of injectors, arranged for complete mechanical and heat efficiency tests; various pumps, calorimeters, indicators, etc.

The *Hydraulic Laboratory,* with a floor space of about 3,000 square feet, is located in the north end of the basement of the engineering building. It is equipped with weighing, pressure, and weir tanks, rotary and reciprocating pumps, water wheel, and water motor. The arrangement of connections makes possible a large number of combinations.

The Drawing Rooms.

The rooms for drawing and design are in the engineering building, four on the sixth floor, two on the fifth, and one on the fourth floor. They aggregate about five thousand square

feet of floor space and are amply lighted and furnished. Their proximity to the foundry, pattern, and machine shops makes it possible to co-ordinate, to an unusual degree, the design and the constructive branches.

The blue-print room is on the mezzanine floor above the sixth, and is approached through a drawing room on the sixth floor. It is equipped with a 40 by 52 inch curved glass blue-print machine, tracing files, blue-print baths, etc.

On the sixth floor of the Arts Building are ample accommodations with overhead light for the work in freehand drawing.

Courses of Instruction.

The figure in parentheses indicates the number of credits that are given for the course. For definition of credit and course see page 16.

Engineering and Mechanic Arts.

The work classified under this head embraces applied mathematics, applied electricity, testing of machinery and instruments, drawing and designing, shop practice, and machine construction.

The aim is to present these subjects in such order and comprehensiveness as to meet the requirements of those who complete the courses and those who do not, enabling some to throw their entire energy into professional studies and others to receive the fundamental instruction necessary for practical work on leaving the Institute.

While the work outlined has direct bearing on the training of the mechanical engineer, the student who expects to follow any branch of engineering or architecture will find much that will be of service in his subsequent work.

The location of the Institute makes possible frequent visits to various extensive manufacturing establishments. These visits are made under the direction of an instructor. When advisable the student makes notes and sketches of those methods and processes with which the work of the class is concerned. A familiarity with constructive work and methods on a scale and in variety impossible of attainment in a single establishment is thus obtained.

In the shops and in the drawing rooms of the Institute, methods and principles will be presented, when possible, by exercises of ultimate value as parts of machines or apparatus.

In shop and drawing room and laboratory work, time cards are made out daily by each student, stating the character of work done, materials, number of machine, and drawings used. These are kept on file and transferred at the end of each six weeks to sheets, showing at a glance the variety of work performed, hours on different machines, etc.

Mechanic Arts.

1. (2) Machine Sketching. This course is designed to enable the student to work constructively in perspective, and to make neat dimension sketches of machine parts.

2. (2) Wood Work. A fundamental course intended as a

preparatory course for the arts and crafts, courses 2a and 2b, and for the engineering courses 7 and 8. The work affords practice in the use and care of the common woodworking tools in the construction of simple models, supplemented with talks on the various kinds of woods in common use and the methods of finishing, and a study of the construction and application of the joints used in woodwork. Practice in wood turning.

2a. (2) WOOD WORK. (*Advanced Course*). The chief object of this course is the practical application of methods pursued in the preceding course to the construction of simple pieces of furniture, and is intended for those who do not intend to follow engineering lines. Students will be required to a great extent to do preliminary designing of projects. This course is supplemented by talks on the construction of furniture and on finishing.

2b. (2) WOOD WORK (*Advanced Course*). A continuation of course 2a, supplemented with a study of designs from different manufacturers, and the mixing of stains, varnishes, and finishes. Practice in the use of woodworking machinery.

3. (2) FORGE WORK. Calculation of stock, simple forging and welding on such work as chains, hooks, rings, eyes, weldless rings, tongs, knuckle and fork forgings. Hardening and tempering of tool steel, forging and tempering of lathe tools, cold chisels, and tools used in the machine and forge shops. Steam hammer work, brazing, case-hardening, electric welding, and a little work with jigs in bending and forging.

Most of the various forgings used around the Institute, for both repair and new work, are made during this course.

4. (2) FOUNDRY WORK. Study of modern foundry construction equipment, materials, and methods. The first four weeks of the quarter are devoted to exercises designed to give practice with and control of all the tools used in making molds, with daily instruction and demonstrations in molding, core making, preparing cupolas and brass furnaces, and the melting of iron and brass. Molding and casting of plain castings for machinery parts will then be taken up and later more difficult pieces requiring special manipulation and equipment. About fifty per cent of the term is spent at floor and bench molding, twenty per cent in class room, ten per cent in shop visits, ten per cent in cupola practice, and ten per cent in core making.

5. (2) INSTRUMENTAL DRAWING. This is the first work with drawing instruments. Lettering and conventional representations of frequently recurring parts of machines, such as nuts, threads, fasten-

ings, etc. Construction of mathematical curves. This course is designed to establish standard methods of lettering, dimensioning, and conventional representations.

6. (2) PROJECTION DRAWING. The knowledge and use of planes of projection, intersections, including conic sections, revolution of views, and development of surfaces are acquired in this course.

7. (2) PATTERN MAKING. A study of the fundamental principles in pattern making in connection with the work of the foundry and machine shop. Practice in the use of general woodworking machines, such as the planer, circular and band saws, lathe, trimmer, and jig saw, and the ordinary hand tools; in the preparation of stock used in the making of patterns and the necessary core-boxes of angle and surface plates, pipes, pipe fittings, valves, pulleys, hand wheels, etc.

8. (2) PATTERN MAKING (*Advanced Course*). A continuation of course 7. A study of more complicated patterns, such as the Corliss Engine, gate valves, air compressors, etc. Methods of ascertaining the weights of castings from the patterns. Application of the methods of the preceding course to the making of patterns for general machine work, including hangers, journal boxes, sheave wheels, pulleys molded in cores, spur, bevel, and work gears, machine details, engine frames, cylinders, valves, etc. Methods used for skeleton work, such as sweeps for loam work and cores, match plates, and follow boards.

9. (2) FOUNDRY WORK (*Advanced Course*). A continuation of Engineering 4, making a study of and molding the more complicated patterns as the student is qualified to do so. A study of and some practice in the methods employed in making heavy castings. Some sweep and strikle work. Considerable time will be devoted to furnace practice and the mixing of metals.

10. (2) MECHANICAL DRAWING. Practice in detail and assembly drawing and tracing of machines. The proper completion of this course should insure a competent tracer. Prerequisites, two courses from *Engineering 3, 4, and 7.*

11. (2) MACHINE DESIGN SKETCHING. This course has for its object facility in putting on paper sketched designs which can afterwards be put into shop drawings.

12. (2) Problems involving the adaptive and inventive faculties with reference to shop processes and limitations of tools. Practice is given in drafting-room methods employed in tooth gearing. Prerequisites, *Engineering 3, 4, 7, 19, 20, and 11.*

19. (2) BENCH METAL WORK. Description of the physical characteristics of the more common materials used in machine work; explanation of the different processes employed in ordinary machine construction, methods of measuring and testing the work; description and names of the forms and uses of the various kinds of cold chisels, hammers, files, scrapers, drills, taps, reamers, and other tools employed in bench and floor work; practice in chipping, filing, scraping, laying-out, drilling, reaming, tapping, fitting, and finishing tools and machine parts.

20. (2) MACHINE TOOL WORK. Explanation of the construction and uses of the different forms of machine tools; directions for operating and keeping tools in order; essential charcteristics of the forms of cutting tools and methods of grinding. Practice on the lathe in centering, plain, taper, and templet turning, chucking, drilling, boring, external and internal thread cutting, hand tool turning, filing, and polishing; on the shaper and plain miller in the making of flat and square surfaces; simple index milling.

21. (2) FORGE WORK. (*Advanced Course*). This course treats more of shop methods and economical handling of work. Jig work, steam hammer work, machine forging, duplicate work, and work with special tools. Cost estimating and shop management. Forge shop design and equipment.

22. (2) MACHINE TOOL WORK (*Advanced Course*). Continued practice in the use of the machine tools, hand tools, standard gauges and measuring instruments in the making and finishing of machine parts, sizing and cutting of spur, bevel, and spiral gears, worms and worm wheels; fitting, erecting, and adjusting machine parts and complete machines.

23. (2) TOOL, DIE, AND SCREW MAKING. Use of the machine and hand tools, standard gauges, and measuring instruments in the making of taps, dies, reamers, straight, spiral, angular, side, end, and formed milling cutters, punching and bending dies, etc. Setting and operating screw machines in the production of screws, nuts, studs, and formed work.

24. (2) MACHINE ANALYSIS AND TESTING. A study of the design of existing machines and tools to determine the principles involved in their construction; examination and tests of various machines and mechanisms for rigidity, accuracy, or efficiency.

Engineering.

13. (3) SURVEYING. Recitations, lectures, field and office work in the theory and practice of plane surveying. In the field distances

are determined by pacing and with the chain and tape. Practice is given in the use of the compass, transit, and level in land and city surveying; in leveling; and in running of simple railway curves. A study is made of the construction of the instruments, with tests and adjustments. Field records and office copies are required.

Prerequisites, *Engineering 1, 5, and 6; Mathematics 6.*

15. (2) ENGINEERING LABORATORY. Such work with engines, boilers, generators, motors, dynamometers, and testing machines as is needed to give the student that familiarity with them requisite to the intelligent study of electrodynamics, thermodynamics, mechanics, and machine designs. Prerequisites, *Engineering 10 and 19; Mathematics 12, Physics 3.*

16. (3) STATICS. Composition and equilibrium of concurrent forces; parallel forces and center of gravity; couples and composition and equilibrium of non-concurrent forces; suspended weights and catenary. Prerequisite, *Mathematics 18.*

17. (3) DYNAMICS. Rectilinear motion; virtual velocities; curvilinear motion; moment of inertia; dynamics of a rigid body; work, energy, and power; friction.

18. (3) STRENGTH OF MATERIALS. Elementary stresses and strains, tension, compression, shear, and torsion; flexure of beams; continuous girders; flexure of long columns; combined stresses.

25. (2) DESCRIPTIVE GEOMETRY. Graphical methods of solving problems of intersections of lines, planes, surfaces and solids, and developed shapes. Practical problems designed to secure facility in the application of principles. Prerequisites, *Engineering 11, Mathematics 14.*

27. (2) SPECIAL MACHINERY DESIGN. The design of some machine which will exhibit the observational, inventive, and analytical ability of the student is undertaken in this course. Students must have completed the previous courses in engineering and physics outlined in the curricula leading to the degree of M. E. before taking this course.

28. (2) KINEMATICS. A study of the laws of motion, linkages, gearing, and problems in the determination of combinations to secure required motions. Prerequisites, *Engineering 12, Mathematics 14.*

31. (2) VALVE GEAR DESIGN. The familiarity of the student with kinematics and his previous practice in drawing are employed in the investigation of various valve gear motions, and in problems in valve and valve gear design. Prerequisite, *Engineering 15.*

32. (2) STEAM ENGINE DESIGN. A study of the fundamental

problems of steam engine design, such as the influence of the weight of reciprocating parts on steady running, etc. A theoretical design will be undertaken and compared with the practice of leading builders.

33. (2) STRUCTURAL STEEL WORK. The study of trusses, plate girders, and details used in building frames, bridges, roofs, and cranes. Specifications of current practice will be considered.

35. (3) DIRECT CURRENT PRINCIPLES AND PRACTICE. Lectures and laboratory work. Magnetic and electric calculations for generators and motors; armature windings; characteristic curves; wiring; instruments. Prerequisites, *Engineering 15; Mathematics 16, 17, and 18; Physics 4, 5, and 6.*

36. (3) ALTERNATING CURRENT PRINCIPLES. Lectures and laboratory work. Sine functions; vectors; reactance; condensance; impedance; series parallel circuits; transmission lines. Prerequisite, *Engineering 35.*

37. (3) ALTERNATING CURRENT MACHINERY. Lectures and laboratory work. Transformer; generator; induction motor; synchronous motor; rotary converter. Prerequisite, *Engineering 36.*

42. (2) HYDRAULICS. The law governing fluids in motion, flow of water through orifices and pipes, losses of head by friction; hydraulic motors and pumps and their efficiencies. Prerequisite, *Engineering 18.*

43. (3) THERMODYNAMICS. Mechanical theory of heat; laws of thermodynamics as applied to heat engines and refrigerating machines; analysis of the action of injectors and other steam apparatus. Prerequisite, *Mathematics 18, Engineering 15.*

44. (2) STEAM BOILERS. The various forms and peculiarities of modern boilers, the proportion of heating surface, grate areas, and chimney capacity, as related to the best performance under various conditions; the various apparatus related to boilers. Prerequisite, *Engineering 15.*

45. (2) ANALYTICAL LABORATORY TESTS. Tests of steam calorimeters; coal and gas fuel value determinations; lubricating oil tests.

46. (2) TESTING MACHINERY PRACTICE. Tests of materials of construction; determining the elastic limit and ultimate strength under tension, compression, and torsion. Prerequisite, *Engineering 18.*

47. (2) HYDRAULIC MACHINERY TESTS. Hydraulic experiments in the flow of water through pipes and orifices; pumps of various kinds tested for the duty performed under known conditions of

power furnished by steam or mechanically transmitted power. Prerequisite, *Engineering 15 and 18.*

48. (2) POWER MEASUREMENT TESTS. Application of rope, hydraulic, and Prony brakes and use of Morin, Weber, cradle floating, and other forms of transmitting dynamometers for determination of absorbed or transmitted power. Analysis of refined engine tests.

49. (3) POWER PLANT TESTS. Complete tests of power plants from the weighing of the coal to the worked up reports of condition, arrangement, and general efficiency of boilers, engines, generators, and motors.

50. (1) SPECIFICATIONS AND CONTRACTS. Commercial specifications and contracts, such as the engineer is likely to require a general knowledge of, are treated in a regular course of lectures supplemented with occasional addresses by men who have given extensive study to special phases of the subject.

51. (9) THESIS. Each candidate for the degree of mechanical engineer is required to present a thesis on some engineering subject which he has investigated during his senior year. In this work he is thrown largely on his own responsibility, and must present a thesis showing capacity for careful observation, invention, and deduction. The subject should be chosen before the close of the junior year and submitted to the head of the department for approval. In the autumn quarter one hour a day is devoted to the literature on the subject, in the winter three hours a day to preparing apparatus and preliminary experiments, and in the spring five hours a day to completing the investigation and writing results. Frequent consultations with the instructor in whose field the subject is chosen and a written weekly report of progress are required. The thesis shall be typewritten, of standard dimensions and binding, and deposited in the library before graduation.

Mathematics.

A continuous and progressive course in pure and applied mathematics for six years is offered, an outline of which is given below.

In the third year of the course, when students have some knowledge of elementary algebra, plane geometry, and trigonometry, ample opportunity is given to apply their knowledge in the study of physics; and in the sixth year students in engineering will have abundant use for their knowledge of mathematics obtained during the five years preceding.

Both the disciplinary and the practical purposes of mathematics are kept in view, and an earnest attempt is made to give due emphasis to each.

By repetition and reviews it is believed facility in the ready and masterly use of mathematics may be obtained, and the course as a whole has been planned with this purpose in view.

1. (2) ELEMENTARY ALGEBRA. Definitions and notations, positive and negative numbers, addition and substraction of algebraic expressions, parentheses, multiplication, division, simple equations, factoring, highest common divisor, lowest common multiple.

2. (2) ELEMENTARY ALGEBRA, four days a week. Fractions, simple equations containing fractions, simple simultaneous equations, inequalities, involution and evolution. CONCRETE GEOMETRY one day a week.

3. (2) ELEMENTARY ALGEBRA, four days a week. Theory of exponents, radicals, quadratic equations, simultaneous equations involving quadratics, theory of quadratic equations, ratio and proportion. CONCRETE GEOMETRY one day a week.

4. (2) PLANE GEOMETRY. Elementary definitions, triangles, parallels, parallelograms, problems, loci of points. The geometric concepts should have been well fixed in mind in courses 2 and 3. In this course the emphasis is to be placed on the logical demonstration of the theorems, and solutions of problems.

5. (2) PLANE GEOMETRY. Equality of polygons, circles, inscribed and circumscribed triangles and quadrilaterials, ratio and proportion. Especial emphasis is placed on original exercises.

6. (2) PLANE GEOMETRY, completed. The last four or five weeks of the quarter will be devoted to an elementary presentation of some of the most useful and fundamental facts of Plane Trigonometry.

7. (2) ACCOUNTING. A study of common and decimal fractions, addition, percentage, discounts, commission, insurance, exchange bills, settlements, averaging accounts, and profit and loss. Special work in mental calculations.

8. (2) ACCOUNTING. Introduction and use of main books used in accounting, and application of principles learned in course 7 to business transactions recorded in them. Exercises in opening and closing books, and practice in writing business papers.

9. ACCOUNTING. Continued use of main books and introduction of four auxiliary books: cash, sales, invoice, and bill books. A short study of partnerships, the adjusting of profits and losses, and making settlements. Attention is given to principles governing the recording of business transactions rather than to particular methods that are limited [illegible] application. It is hoped that the student who has taken [illegible] will be able to devise a system answering the requirements of an ordinary business.

10. (3) ADVANCED ALGEBRA. A review and more thorough study of the fundamental operations. Solution of equations, theory of exponents and surds. Theory of quadratic equations, indeterminate equations of the first degree, inequalities, ratio and proportion, progressions.

11. (3) SOLID GEOMETRY. Lines and planes in space, pencil of planes, polyhedral angles, polyhedra, parallelopipeds, prisms and pyramids, the cylinder, cone, and sphere, similar solids.

12. (3) TRIGONOMETRY. Plane trigonometry, with an introduction to spherical trigonometry.

13. (3) COLLEGE ALGEBRA. Permutations and combinations, the binomial theorem, limiting values and vanishing fractions, convergency and divergency of series, undetermined coefficients, summation of series, introduction to the theory of equations.

14. (3) PLANE ANALYTICAL GEOMETRY. Systems of co-ordinates; the equations and properties of the point, straight line, circle, parabola, ellipse, and hyperbola; the general equation of the second degree.

15. (3) ADVANCED ANALYTICS.

16. (3) DIFFERENTIAL CALCULUS. The elements of differential calculus.

17. (3) INTEGRAL CALCULUS. The elements of integral calculus.

18. (3) APPLIED CALCULUS. Applications of calculus to the operations most frequently required in engineering subjects; intended to familiarize the student with the use of calculus as a practical instrument in mechanics, thermodynamics, and electricity.

Physics.

The work of the department consists of courses in general physics, together with special courses for students in engineering.

The design of the courses in general physics is to familiarize students with the principles of physics, to cultivate correct methods of laboratory work, and to serve as an introduction to applied mathematics. Attention is given to the preparation of records, to the manipulation of apparatus, and to the cultivation of the patience necessary to secure the best results.

The advanced courses may not be taken until the student has had such work in mathematics as will enable him to solve the problems that arise in lecture discussion and detailed laboratory practice. These courses are designed for students who intend to specialize in physical science or in engineering.

1. (3) GENERAL PHYSICS. Mechanics: A discussion and illus-

tration of physical quantities and their measurement; simple types of motion; density, velocity, acceleration, force, work, power and efficiency, elasticity, and surface tension.

LABORATORY PHYSICS. Strictly quantitative, covering subjects named above.

2. (3) GENERAL PHYSICS. Heat: Thermometer, expansion, calorimetry, change of state, solutions, transference of heat, and theory of gases. Sound: Waves, sounds and their relations, sonorous bodies, compound tones and musical instruments. Light: Nature and propagation, reflection, refraction, theory of optical instruments, interference, dispersion, radiation and absorption of light waves, color, and polarization.

LABORATORY PHYSICS. Quantitative work in heat, sound, and light.

3. (3) GENERAL PHYSICS. Electricity: Electrification, the electric field, electrostatic instruments, electric discharges, magnetism; the electric current, the electromagnetic field, relations between heat and electricity, units, telegraph and telephone, and electric waves.

LABORATORY PHYSICS. Quantitative measurments of current; electromotive force and resistance; testing batteries, incandescent lamps, arc lamps, motors and generators, and calibration of instruments.

4. (3) MECHANICS. Standard units; dimension of dynamical units; properties of matter; measurments of precision in length, mass, and time; kinematics; statics; dynamics; special problems. Prerequisite: *Mathematics 12.*

5. (3) HEAT AND LIGHT. Calorimetry; radiation, conduction; thermodynamics; kinetic theory of gases; kinds of vibration; media of propagation; measurement of light waves; interference, reflection, and refraction of waves; photometry; special problems for advanced students. Prerequisite: *Mathematics 12.*

6. (3) ELECTRICAL MEASUREMENTS. Magnetism; magnetic units; measurement of earth's field; electrostatics, electromagnetism; electromagnetic units; electrodynamics; measurement of resistance, current, electromotive force, quantity, capacity and temperature co-efficients; calibration of instruments; electromagnetic theory of light. Prerequisite: *Mathematics 12.*

8. (3) PRIMARY AND SECONDARY BATTERIES. Historical development; modern theories; reactions; uses of different types; complete tests of primary and storage cells; care and maintenance. Prerequisites: *Course 6 and Chemistry 1.*

9. (3) ELECTRO-METALLURGY. Testing of primary and secondary batteries; electroplating; resistance of electrolytes; Faraday's laws; special investigations in electrolysis. Prerequisites: *Course 8 and Chemistry 1.*

10. (3) THEORIES OF PHYSICS. Advanced course in electricity supplemented by research work in the laboratory. Prerequisites: *Course 8 and Mathematics 17.*

Chemistry.

The aim of the courses in chemistry is to give in the first place a knowledge of the fundamental principles of the science as a part of a general education; and afterwards a more extended knowledge of the subject and practice in manipulation to those who wish to devote themselves to pure or applied chemistry, or whose work along other lines will be made more efficient by a thorough training in chemistry. In the advanced work in chemistry a reading knowledge of German is assumed. Engineering students are encouraged to become familiar with the principles on which manufacturing processes or industrial methods are based, so that a firm foundation is laid for subsequent specialization in these directions. Opportunities are given for excursions to the plants of chemical industries located in and near Chicago.

All students taking courses in chemistry are required to deposit two dollars each quarter to cover charges for breakage. If the charges do not amount to the sum deposited, the excess is returned to the student.

The courses in general chemistry give a knowledge of the natural occurrence, methods of preparation, properties and reactions of the important elements and compounds, explain these facts according to modern theories, point out their application to industrial processes. Instruction is given by means of lectures and recitations, illustrated by experiments whenever advantageous. In connection with each subject studied the student is required to read some standard work. The greater part of the laboratory work is qualitative, but it includes quantitative experiments involving both gravimetric and volumetric methods, and also a few inorganic preparations on a somewhat elaborate scale. Lectures and recitations, five hours a week; laboratory work, ten hours a week. Reference book, Newth's Inorganic Chemistry. Prerequisite: *Physics 1-3.*

Students who have credit for the chemistry course of the ordinary high school are required to take the lecture and recitation work of 1, 2, and 3, but special laboratory work is arranged for

them in the fall quarter. If they show sufficient proficiency, they are excused from laboratory work for the rest of the year and on the completion of the course are given 6 credits.

1. (3) GENERAL CHEMISTRY. Chemical change, three states of matter, solution and crystallization, elements and compounds, oxygen, hydrogen, and the elements of the chlorine group.

2. (3) GENERAL CHEMISTRY. Continuation of course 1. The remaining non-metallic elements; acids, bases, and salts; electrolysis.

3. (3) GENERAL CHEMISTRY. Continuation of course 2. The metals. Qualitative analysis is not taught, but some of the more important analytical reactions are studied, so that at the end of the course the student is expected to be able to recognize any simple salt and to understand the methods of separation of various groups and elements.

The work in chemistry of the second year begins with course 4, one quarter of qualitative analysis given in the fall. This course is prerequisite to all more advanced work. At the beginning of the Winter Quarter the students are divided into three groups. Those intending to pursue chemical studies beyond this year take courses 5 and 6, advanced qualitative and beginning quantitative. Those preparing for medicine or domestic economy, and those who wish a more general knowledge, take courses 7 and 8, organic chemistry. Engineering students take courses 6 and 22, quantitative analysis of engineering materials.

The courses in qualitative analysis begin with simple analysis and lead to the study of complex mixtures, minerals, alloys, etc. They include the methods of the recognition of the more common organic acids, and of various other substances of special interest and importance to medical students, together with toxicological work. The lectures treat in considerable detail of certain selected portions of theoretical and physical chemistry, special reference being made to the basis of analytical chemistry. Laboratory work, twelve hours a week; lectures and recitations, three hours a week. Textbook, Prescott and Johnson's Qualitative Analysis. Prerequisites: *Courses 1-3.*

4. (3) QUALITATIVE ANALYSIS. Lectures on the theory of analysis. General analysis, including that of complex mixtures and minerals.

5. (3) QUALITATIVE ANALYSIS. Continuation of course 4. Analysis of alloys, etc. Toxicological methods. Lectures on theoretical chemistry.

The courses in organic chemistry consist of lectures and recita-

tions on the simpler types of carbon compounds, and their preparation and purification in the laboratory. Lectures and recitations, three hours a week; laboratory work, twelve hours a week. Prerequisites: *Courses 1, 2, 3, and 4.*

7. (3) ORGANIC CHEMISTRY. The work is based on Perkin and Kipping's Organic Chemistry. Aliphatic series.

8. (3) ORGANIC CHEMISTRY. Continuation of course 7. Aromatic series.

The courses in quantitative analysis include exercises in gravimetric, volumetric, and electrolytic methods and gas analysis. Theoretical work consists of lectures and recitations on physical chemistry in course 6, and of reading advanced works on general and historical chemistry in courses 9 and following. Courses 10-19 are special courses designed to meet the needs of those who wish to become familiar with the analytical methods employed in regulating the manufacture and determining the purity and value of the substances indicated. The laboratory work in each course is supplemented by the reading of special works treating of the respective subjects. Course 9 is prerequisite to courses 10-19 and courses 7 and 8 to courses 17-19. Laboratory work, twelve hours; lectures and recitations, three hours a week.

6 (3) QUANTITATIVE ANALYSIS. Continuation of course 5. Simple gravimetric and volumetric determinations leading to course 9. Lectures and recitations on quantitative analysis.

9. (3) QUANTITATIVE ANALSIS. Moderately complex separations, volumetric precipitations, and oxidation and reduction.

10. (3) IRON AND STEEL ANALYSIS. Including the microsopic structure.

11. (3) IRON ORE ANALYSIS.

12. (3) WATER ANALYSIS. Analysis of drinking water and of boiler feed water, including the analysis of boiler scale.

13. (3) FUEL ANALYSIS. Especially the analysis of coke and coal, including calorific determinations.

14. (3) GAS ANALYSIS. Including both fuel gas analysis and illuminating and fuel gas analysis.

15. (3) CEMENT ANALYSIS. Including materials and finished product.

16. (3) COMPLEX MINERAL ANALYSIS. Including silicates, ores, and rare elements.

17. (3) OIL AND SOAP ANALYSIS. Analysis of oils, lubricators, and soaps.

18 (3) PAINT ANALYSIS. Including oils, varnishes, and pigments.

19. (3) FOOD ANALYSIS. The testing of foods for quality and purity.

20. (3) INORGANIC PREPARATIONS.

21. (3) ORGANIC PREPARATIONS.

22. (3) FUEL, GAS, AND OIL TESTS. This is a special course designed to meet the needs of students in mechanical engineering. It consists of the chemical tests which are commonly employed by engineers, including coal and gas fuel value determinations, flue gas analysis, lubricating oil tests, etc. Prerequisites: *Courses 4 and 6.*

Physiography and Geology.

In the courses in physiography and geology, lectures, recitations, and laboratory methods of work are used. The aim in physiography 1 and 2 is to give a broad introductory course that shall open up the field of science and give the student a notion of its methods and scope. Physical geography is made the central subject. The study includes observations on the heavenly bodies, such illustrated lectures and laboratory exercises as are necessary for the student to make good use of his observations, lecture table demonstrations and laboratory exercises on the elementary physical and chemical phenomena fundamental in understanding the problems taken up in the physical geography, and finally an application of physiographic principles to the geography of the world, with especial attention to the physiographic control of man's activities. Since the study is taken at a time when many students are thinking of the choice of their life work, it is thought that this broad survey of man's activities as influenced by controlling conditions is most opportune. The effort is made to adapt the work to the needs of the student at this particular stage of his development, to stimulate his interest in the phenomena of nature, to satisfy his cravings for such knowledge, and to develop his powers of observation and reasoning while acquiring a fund of useful information. Opportunities are afforded for such outdoor field excursions, under the guidance of the instructor, as the weather will permit, and also for visits to the museums and other places that may profitably be visited. The department possesses a four-inch refracting telescope, Laing's planetarium, Morse's heliodon, a large assortment of topographical maps, geological maps, coast and river survey charts, relief models, weather maps, lantern views, facilities for molding the land forms, the more important books of reference, and books of travel adapted to the age of the student.

1. (2) PHYSIOGRAPHY. The motion of the earth and its relation

to the sun and moon; elementary meteorology and climatology; distribution, movements, and deposits of the ocean.

2. (2) PHYSIOGRAPHY. The land: The modern doctrines of the origin and development of the surface features of the earth, the agencies involved, and the resulting forms are carefully studied and classified. By a study of the great examples of these forms a picture is built up of the great features of the continents. Especial attention is given to the distribution of life on the earth, its relation to topographic and climatic features, and the control of these things over man. Saturday field excursions.

Course 2 may precede or follow course 1, according as the work is commenced in the autumn or winter.

4. (3) GENERAL GEOLOGY. The elementary features of dynamical, structural, and historical geology. Emphasis is placed upon the leading facts and principles of the science and the more important events of geological history.

Prerequisites: *Courses 1 and 2; Physics 1-3, and Chemistry 1-3, or their equivalent.*

Biology and Physiology.

1, 2, 3. (9) GENERAL BIOLOGY. Animal morphology, comparative anatomy, histology, physiology; development and life history, ecology; geographical and geological distribution. The cell theory; principles of organic evolution; development of modern theories. Plant physiology and ecology; studies in systematic botany; economic biology.

4, 5, 6. (9) HUMAN PHYSIOLOGY. Laboratory studies in vertebrate dissection and histology; demonstrations and experiments dealing with the chemical and physiological processes of physiology. Lectures and reference work on the anatomy and physiology of the human body. Special attention to the processes of nutrition and the study of foods in relation to these processes. Physiological aspect of home sanitation problems, i. e., heating, lighting, ventilation, and plumbing of houses. Personal hygiene: health ideals, the right attitude of the individual towards the maintenance of health; development of new health problems arising from modern environmental conditions and changed heredity.

Domestic Economy.

The courses in Domestic Economy are planned with reference to the needs of two classes of students: (1) Young women who are preparing to teach cooking and sewing; (2) Girls who wish to acquire a knowledge of the household arts in connection with other studies of the high school.

The teachers' courses in domestic economy are of college grade

and presuppose a high school training. In cooking and in sewing there are courses of instruction extending over a period of two years. The time required to prepare for teaching depends on the previous preparation and special aptitude of the candidate. College graduates and experienced teachers may in one year make adequate preparation for teaching domestic economy. High school graduates are advised to take, in connection with the instruction that is offered in domestic economy, courses in English and in the physical and biological sciences amounting to not less than two years of college work. Those who are preparing to teach in high schools should give themselves the advantage of not less than four years of college training.

Following are the courses of instruction that are offered in this department.

A. (2) SEWING. This course is designed for the younger pupils. It includes the making of plain undergarments, with talks on materials and implements used. Use of machine with simple attachments.

B. (2) SEWING. Taking of measurements, making of undergarments continued, cutting from patterns.

C. (2) SEWING. Cutting and making of shirt waists, thin gowns, and dressing-sacks.

In connection with A, B, and C, four hours a week may be given to millinery.

D, E, F. (9) SEWING. These courses are designed for those who are preparing to teach, and include, in addition to the sewing defined under A, B, and C, drafting, the study of textiles, and the principles of design. Simple designs in flat colors, such as borders, rugs, etc.; color harmony; lettering for monograms; proportions of the human figure; sketching from life; designs for undergarments, waists, dresses, hats, etc.

G, H, I. (9) SEWING. A continuation of D, E, and F. Advanced sewing; millinery; textiles and weaving.

1. (2) COOKING. This course is designed for the younger pupils. It includes six hours a week of practical cooking, and four hours of elementary work in fuels, lighting, cleaning, the care of the house, and the composition of a few simple foods.

2. (2) COOKING. A continuation of course 1.

3. (2) COOKING. Most of the time of this course is devoted to practical cooking with the view of covering as much of the work of courses 1 and 2 as the time will permit.

4. (1) HOUSEKEEPERS' COURSE IN COOKING. This course consists of practical work in the preparation of food, with the study of the food principles and the effect of heat upon each. It is de-

signed to meet the needs of housekeepers rather than of young students. Two periods a week of two hours each.

5. (1) HOUSEKEEPERS' COURSE IN COOKING. A continuation of course 4. Instruction is given in the preparation of more elaborate dishes and in serving. Two periods a week of two hours each.

6. (2) HOUSEKEEPERS' COURSE IN COOKING. This course includes the work of courses 4 and 5. Four periods a week of two hours each.

7. (3) DOMESTIC ECONOMY. (a) The cooking of simple foods. The work is arranged to illustrate the different methods of cooking, and the effect of heat upon the five food principles. It includes also a study of the materials used. Laboratory work, four hours a week.

(b) Home Sanitation. A model house is planned, and its situation, ventilation, and plumbing discussed.

(c) Bacteriology. A laboratory course. Exercises illustrating the morphology, physiology, and reproduction of bacteria; preparation of permanent mounts; making and use of culture media; sterilization, pasteurization. Similar studies with yeasts and molds, Placing of micro-organisms in air, milk, water, etc., from different sources. Supplementary lectures.

8. (3) DOMESTIC ECONOMY. (a) A continuation of 7 (a), with advanced work in cooking. The cost of food. Laboratory work, four hours a week.

(b) Economics of the Household. The cost of living and the apportionment of the income. Family budgets and their value. Methods of keeping household accounts. A special consideration of woman's changing economic position and the effect upon the family. The servant problem.

(c) Household Sanitation. Fermentation and decomposition; the work of enzymes and of micro-organisms in the preparation of certain foods and other articles, and in the completion of nature's food cycle; principles underlying the various physical and chemical means employed for the preservation of foods from the destructive action of germs; the relation of these organisms to various household activities. Lectures, reference work, and demonstrations.

9. (3) DOMESTIC ECONOMY. (a) Cooking in large quantities. Invalid cookery. Chafing dish course. Dietary work. Laboratory work, four hours a week.

(b) Applied Chemistry. Experimental study of food principles. The detection of adulterations and preservatives in food. The chemistry of digestion.

(c) General Sanitation or Public Hygiene. Relation of germ life to water, ice, and milk supplies, and to various uncooked foods; the testing and inspection of these; duties of individuals, corporations, and municipalities to the public in these respects; disposal of garbage and sewage in the household and by the municipality; the prevention of common transmissible diseases; the care by the public of the public buildings and streets. Lectures and reference work, field excursions.

10, 11, 12. (9) A continuation of 7, 8, and 9.

In connection with courses 7-12 work is given in dietetics. These courses are designed for those who are preparing to teach, and for others who wish instruction in advance of that given in preceding courses.

History and Political Economy.

The courses in history, as outlined below, are arranged in three groups, to each of which one year is given. The work is designed to secure three results: first, a knowledge of the important facts of history; second, a method which shall lead the pupil to think historically and to use historical material correctly; third, an interest in the subject which shall continue beyond the school or college courses.

1. (2) ANCIENT HISTORY. The history of the Eastern nations, Egypt, and Greece to the beginning of the Peloponnesian war. The course includes a study of the geography of the Mediterranean basin and the Euphrates valley, the characteristics of the various nations, and their contributions to civilization.

2. (2) ANCIENT HISTORY. The history of the Mediterranean lands from the beginning of the Peloponnesian war (431 B. C.) to the close of the Punic wars. A special study is made of the later development of the Greek states, the rise of Macedonia, the empire of Alexander, Rome's rise to supremacy in Italy and the contest with Carthage.

3. (2) ANCIENT HISTORY. The history of Roman rule from the end of the Punic wars (146 B. C.) to the death of Theodosius. Particular attention is given to the fall of the Republic, the development of the imperial system, the rise and organization of the Christian Church, and the causes of the decline of the Empire. A rapid survey is made of the history of West Europe from 395 A. D., the death of Theodosius, to 800 A. D., the crowning of Charles the Great.

4. (3) AMERICAN HISTORY. The European and English background of American history, the conditions that led to the discovery of America, the colonization of the Americas, and the history of the English colonies to 1763.

5. (3) AMERICAN HISTORY. The conflict between the colonies and England, with a study of the political differences between the two; the development of confederate government during the Revolution; the political and industrial growth of the United States, particularly of the West.

6. (3) AMERICAN HISTORY. The beginning of sectional differences, acquisition and government of new territories; the fight for slavery extension; reconstruction and its effects; and the modern United States.

7. (3) EUROPE FROM THE FOURTH TO THE FOURTEENTH CENTURY. An outline course in general European history covering the period from the Council of Nicea to the removal of the Papacy to Avignon, treating in such details as the time will permit the civilization and institutions peculiar to the period.

8. (3) EUROPE FROM THE FOURTEENTH TO THE EIGHTEENTH CENTURY. From the exile at Avignon to the close of the Seven Years' war. An outline study of the Renaissance, Reformation, Counter Reformation, Religious and Dynastic wars, and the struggle for colonial and commercial supremacy.

9. (3) EUROPE SINCE 1763. The effects of the American Revolution on Europe, attempts at reform, the French Revolution, Napoleon, the Holy Alliance, reforms in England, and the unity of Germany and Italy are some of the subjects that will be considered in the course.

10. (3) POLITICAL ECONOMY. (a) *Principles*—The Value of Material Things: Want and present goods, wealth and rent, capitalization and time value.

(b) *History*. Adam Smith and his predecessors.

11. (3) POLITICAL ECONOMY. (a) *Principles*—The Value of Human Services: Labor and wages, enterprise and profits.

(b) *History*. The industrial revolution.

12. (3) POLITICAL ECONOMY. (a) *Principles*—The Social Aspects of Value: Relation of private income to social welfare, relation of the state to industry.

(b) *History*. Present day conditions.

Psychology, Logic, and Ethics.

The work in Philosophy is intended to give a general outline of the field of Psychology, Logic, and Ethics, and at the same time to make the student acquainted with the methods and problems of Philosophy.

The work is carried on by means of text-books, recitations, and

lectures. Collateral reading from standard authors forms the basis for written thesis by the student.

1. (3) PSYCHOLOGY. A description and analysis of the fundamental processes of the mental life, with emphasis on their physiological aspects. James's Psychology, briefer course, is used as a text-book, with assigned readings from other works.

2. (3) LOGIC. The basis of the course consists of a study of conception, judgment, and reasoning in formal logic; but some of the wider applications of logic, such as the relation of language and thought, and the purpose of the thinking process, are studied.

3. (3) ETHICS. The aim of the course is to acquaint the student with the important ethical theories, and their bearings upon the ideal of conduct and life. The student is expected to compare and criticise the different points of view, with a view to forming an independent opinion.

English.

Instruction is offered in English grammar, composition, oral reading, public speaking, and literature.

The historical grammar of English is not presented formally at any point in the course, but daily drill is given in matters of correct conversational usage.

In the teaching of composition the aim is to develop in the student the largest possible amount of practical power—the ability to present his own thoughts in clear and orderly fashion.

Throughout the course practice is given in oral reading. No attempt is made to cultivate the elocutionary graces. Simple and intelligent reading is found to be an end sufficiently difficult to attain.

Throughout the course practice is given in public speaking. The pupil is expected to face the class and speak to it with simplicity and directness. He is urged to choose topics in connection with which he can appeal to his audience for definite action.

In most of the literary courses, masterpieces are chosen and presented with reference to the ascertained interests and ideals of the student. In courses 7 and 9 this principle is subordinated to the "uniform college entrance requirements."

In courses 1-6 the regular text-books at present used are as follows: Lewis, First Manual of Composition, revised edition; Lewis, Introduction to the Study of Literature; Moulton, Old Testament Stories; Shakspere, the Merchant of Venice, edited by Miss Underwood; and numbers 21, 40, 27, 37, 133 in the Riverside Literature Series, being selections from Franklin, Hawthorne, Thoreau, and

Warner, with Schurz's Life of Lincoln. These books are referred to below by abbreviations.

1. (2) The chief object of Course 1 is correctness in speaking and writing English. Average sections cover First Manual, Chap, I., and Moulton. Special sections omit Moulton and receive more drill in correctness.

2. (2) Average sections cover First Manual, Chap. II., and Introduction, I.-V. Special sections take fewer chapters of literature and more drill in correctness.

3. (2) Average sections cover First Manual, III., and Introduction, VI.-X. Special sections abbreviate Introduction.

4. (2) Average sections cover First Manual, IV., Franklin (21), Hawthorne (40), and Thoreau (27). Special sections omit 21 or 27, or both.

5. (2) Average sections cover First Manual, V., Schurz's Lincoln (133), and Warner (37). Special sections omit 37.

6. (2) Average sections cover First Manual, VI., and Merchant of Venice. Special sections omit Merchant of Venice.

1-6. Composition. Students who for whatever reason have not attained the degree of correctness required for entrance to course 7 are assigned to course 1-6, which amounts to a review of all preceding work in writing and speaking English.

7. (3) Literature and Composition. The following masterpieces will be studied in 1906-1907: Shakspere's Julius Cæsar; Milton's L'Allegro, Il Penseroso, Comus, and Lycidas; Burke's Speech on Conciliation with the American Colonies; Macaulay's Life of Johnson, and Essay on Addison.

8. (3) Composition. The work is based on Lewis's Second Manual of Compositon. Required of all candidates for the academic certificate.

9. (3) Literature and Composition. The following masterpieces will be read in 1906-1907: Shakspere's Merchant of Venice and Macbeth; Addison and Steele's Sir Roger de Coverley Papers; Irving's Life of Goldsmith; Coleridge's The Ancient Mariner; Scott's Ivanhoe and Lady of the Lake; Tennyson's Gareth and Lynette, Lancelot and Elaine, and The Passing of Arthur; Lowell's The Vision of Sir Launfal; George Eliot's Silas Marner.

10. (3) Rhetoric and English Composition. This course lays stress upon the structure of the whole composition, the paragraph, and the sentence. It affords practice in writing by numerous exercises and themes. In 1906-1907 Newcomer's Elements of Rhetoric will be used as a basis for the exercises.

11. (3) English Literature and Composition. This course is

intended to serve as an introduction to the theory of literature; but on the principle that sane criticism presupposes an intimate knowledge of facts, a considerable body of English poetry is required to be committed to memory. Almost daily written work is required, in the form of brief criticisms and interpretations.

12. (3) ENGLISH COMPOSITION. The object of this course is threefold: To give a more technical theory of composition than that of course 9; to afford some practice in the construction of long themes, and to secure fluency by daily themes illustrating many types. Much personal consultation is required. Lewis's Specimens of the Forms of Discourse is used as a text-book, and is supplemented by lectures.

13. (3) SHAKSPERE. Dowden's Shakspere Primer and the following plays: Romeo and Juliet, Hamlet, King Lear, Anthony and Cleopatra, Coriolanus, and The Tempest.

14. (3) THE ENGLISH ESSAY. A rapid survey is attempted of the history of the essay as an exponent of life and thought, particularly that of the present century. The authors especially studied are Hazlitt, Lamb, Landor, Newman, Carlyle, Emerson, Ruskin, Arnold, Stevenson. Each member of the class will provide himself with Emerson's Essays, first and second series. For the other authors the student will be able to use the special library of duplicate volumes provided by the Institute for this course.

15. PUBLIC SPEAKING. In connection with courses 10-12 a total of fifty short speeches is required of every student, over and above the regular work of these courses.

16. VOICE CULTURE FOR WOMEN. The aims of this course are three: To improve the health of students by proper training of the voice and the respiratory organs; to supplement the work in public speaking; and to correct such faults of address as hinder success in practical life. All college women are urged to elect this course, which may be taken as a regular study or as a half study.

German.

The methods employed in this department are intended to establish a broad and thorough foundation for an appreciative study of German literature.

Courses A-I cover a period of three years for high school students. Courses 1-9 cover a period of three years for college students.

Accurate and intelligent pronunciation is considered a valuable means for securing accuracy in inflection and fluency in speaking. The principles of phonetics are presented in simple form and repeated practice on exercises prepared especially for this purpose is required both in the class room and in the preparation of the lesson. Colloquial practice is introduced at the outset, taking at first the

form of simple questions on the text, and increasing in difficulty until the entire recitation is conducted in German.

Translation from German into English is regarded as a means to an end, and is discarded when it is no longer needed as a test of the understanding of the text.

In composition direct translation from English into German is employed to some extent, but preference is given to reproductive exercises and independent themes. Exercises of this sort are required at least twice a week throughout the course.

The simpler principles of historical grammar are presented incidentally at an early stage in the course, and constant reference is made to the relation between English and German.

A, B. (4) ELEMENTARY GERMAN. Drill on pronunciation; the inflection of nouns, adjectives, pronouns, and the simpler forms of verbs.

C. (2) ELEMENTARY GERMAN. Grammar continued. Verb forms are emphasized. Easy prose reading.

D. (2) READINGS IN EASY NARRATIVE PROSE. Continued drill on grammatical forms. Prose composition based on texts read.

E. (2) NARRATIVE PROSE AND ONE EASY COMEDY. Reproductive translation into German. Conversational exercises.

F. (2) SCHILLER'S WILHELM TELL. Reproductive translation and independent themes.

G. (2) SCHWEITZER-SIMONNOT'S Deutsches Lesebuch für Quarta und Tertia.

H. (2) GERMAN PROSE COMPOSITION. Jagemann's or Poll's textbook.

I. (2) A MODERN NOVEL. Sudermann's Frau Sorge or Freytag's Soll und Haben.

1, 2, 3. (9) ELEMENTARY GERMAN FOR COLLEGE STUDENTS. Thomas's Grammar, Part 1. Leander's Träumereien. Schweitzer-Simonnot's Lesebuch.

4. (3) HISTORICAL PROSE. Ranke's Kaiserwahl Karls V Goethe's Götz von Berlichingen.

5. (3) PROSE COMPOSITION AND THEMES.

6. (3) MODERN NOVELS. Ebner-Eschenbach, Freytag, Sucermann.

6a. (3) SCIENTIFIC GERMAN. Paszkowski's Lesebuch.

7. (3) SCHILLER. Der dreissigjährige Krieg and Wallenstein's Lager.

8. (3) SCHILLER. Die Piccolomini and Wallenstein's Tod.

9 (3) THE MODERN DRAMA. Kleist, Grillparzer, Hebbel, Hauptmann, Sudermann, Fulda.

French.

The elementary work in French (courses 1-4) is adapted to the requirements of college students who wish to begin French, and is done in the time usually assigned to it in colleges which offer elementary French.

High school students who have had two or three years of Latin may be admitted to these classes if their other work is so planned as to allow the requisite time for preparation.

Perfect and intelligent pronunciation is considered necessary to an intelligent understanding and speaking of the language. Exercises prepared to secure these results are required both in the preparation of the lesson and in the class room. Idiomatic conversation is introduced at the outset and continued until the whole recitation can be carried on in French. A minimum amount of translation from French into English is accepted and only as a test of the understanding of the text.

For prose work dictations, reproductive exercises, and themes are preferred to translatng from English into French.

1. (3) ELEMENTARY FRENCH. Rudiments of grammar; careful drill in pronunciation; memorizing of easy expressions and proverbs; reading of anecdotes and short selections. Grammar: Beginner's French, François.

2. (3) ELEMENTARY FRENCH. Grammar: special attention given to irregular verbs and idioms; frequent conversational exercises; prose composition based on texts read. Grammar: Fraser and Squair for reference. Reading: François and Giroud's Simple French. Sans Famille (Malot) Le Petit Chose (Daudet).

3. (3) MODERN SHORT STORIES. Text for the quarter will be selected from the following: Le Tour de la France (Bruno), Colomba (Mérimée), Jeanne d' Arc (Lamartine), Le Pays de France (Foncin), Hystoire d'un Paysan (Erckmann et Chatrian), Les Normands en Angleterre et en France (Thierry). Prose and conversation based on texts read.

4. (3) MODERN FRENCH COMEDIES. Texts for the quarter will be selected from the following: Moi (Labiche et Martin), Le Luthier de Crémone, Le Tresor (Coppée), Mlle. de la Seiglière, Sandeau, Le Voyage de Monsieur Perrichon (Labiche et Martin). Frequent résumés and abstracts of portions of texts read, dictations, and conversational exercises.

5. (3) CONSIDERATION OF THE ROMANTIC SCHOOL, WITH SPECIAL STUDY OF VICTOR HUGO. Reading: Quatrevingt treize, Hernani, La Chute, and other works of that period. Prose; frequent reproductive exercises; letters, business and friendly, twice a week.

6. (3) MOLIERE. A careful study of his chief comedies and ideas. Reading: Le Bourgeois Gentilhomme, L'Avare, Les Precieuses Ridicules. Dictations; abstracts or reproductions from memory of portions of text read. Themes in French.

6a. (3) SCIENTIFIC FRENCH. This course is co-ordinate with French 6 in the literary course. Scientific readers and periodicals. Prose based on texts read.

7. (3) THE CLASSIC DRAMA: CORNEILLE, RACINE. Reading: Le Cid, Polyeucte (Corneille); Athalie, Andromache (Racine), with some attentions to the conditions of the stage and literary production in the time of Louis XIV. Dictations; practice in giving French paraphrases of portions of texts read; themes; collateral reading in different literatures.

8. (3) FRENCH CLASSIC PROSE. Pascal, La Rochefoucauld, Bossuet, La Bruyère, Madame de Sévigné. Reference work in literature and history. Themes in French.

9. (3) CRITICAL PROSE OF THE NINETEENTH CENTURY AND ESSAYISTS. Sainte Beuve, Taine, Brunetière, La Maitre. Themes based on subjects suggested by the reading.

Spanish.

Spanish is offered as an elective for advanced students in French and for others who may desire a practical knowledge of the language for business purposes.

1. (2) ELEMENTARY SPANISH. De Tornos' Grammar; all exercises written and reviewed orally. Appleton's Readers. Dictation and conversation.

2. (2) ELEMENTARY SPANISH. De Tornos' Grammar. El Capitan Veneno (Alarçón). Essays, oral and written. Commercial letters.

3.(2) MARIANELA (GALDOS). Reading, selections from El si de las Niñas (Moratin); Quien es Ella? (Bretón de las Herreros); Doloras (Campoamor).

Latin.

The course of study in this department includes, in addition to the usual four years of training preparatory for college, all the work in Latin regularly required in the best colleges for the degree of A. B. The courses are planned with a view to the student's progressive development and the acquisition of a constantly increasing grasp of the language which shall enable him to read Latin with understanding and comparative ease, and, in the later years of his course, with some amount of literary appreciation of the authors read.

Correct pronunciation with special regard to quantity is insisted upon from the beginning, so that by the time the student has reached the study of Latin poetry the hexameter should present little or no difficulty. In the acquisition of a vocabulary emphasis is laid upon the grouping of related words. Grammatical accuracy and familiarity with the principles of the language are sought rather through careful and constant practice in reading and writing Latin than by committing abstract rules to memory.

With a view to the development of speed and facility in reading, special attention is paid to translating at sight and hearing, and to the practice of reading aloud in the Latin with a proper appreciation of the sense of the author. Translation from Latin into English is from the beginning regarded as a part of the student's work in English composition, and the careless or distorted use of English resulting from literal translation is not allowed. The translation of English into Latin forms an important part of every course, exercises being based in the main upon the text read, but in the later years simple English narrative is substituted. Literature is studied historically as an expression of the life of the people and with reference to the times and the circumstances under which the writers lived, and in the more advanced classes attention is paid to the elements of style and of literary criticism. Systematic supplementary reading is encouraged, for which ample opportunity is offered by a carefully selected library. The work of the classes is supplemented by stereopticon lectures illustrating the monuments of Rome, Roman antiquities, historical sites, and Roman private life.

1, 2. (4) ELEMENTARY LATIN. The student is introduced to the important principles of the Latin language by a series of graded exercises, intended to render him familiar with the elements of Latin grammar and syntax. Special attention is paid from the outset to correct pronunciation and the training of the ear.

3. (2) ELEMENTARY LATIN. Selections from Ritchie's Fabulae Faciles.

4. (2) SELECTED FABLES AND STORIES from Roman history.

5, 6. (4) SELECTIONS FROM CAESAR'S GALLIC WAR AND OVID'S METAMORPHOSES.

7, 8. (6) CICERO, ORATIONS AGAINST CATALINE. SALLUST, CATALINE. The orations of Cicero and Sallust's Cataline form the basis of a study of the political and social conditions in Rome at the end of the Republic. That the student may feel in the Latin the spirit of the orations there is frequent drill in reading aloud. In the work of Latin writing special attention is paid during these two quarters to the writing of continuous narratives.

9. (3) CICERO. PRO ARCHIA; PRO MARCELLO; SELECTED LETTERS. Prose writing as in courses 7 and 8.

10. (3) VIRGIL, ÆNEID I., II. Special care is here given to the literary quality of the student's translations, and written translations of long passages are required. Formal drills in grammar are kept in the background so as to hinder as little as possible the student's interest in the story. Translations at sight, and weekly exercises in Latin writing.

11. (3) VIRGIL, ÆNEID, III., IV. This course is a continuation of course 10.

12. (3) VIRGIL, ÆNEID, V., VI. General review. Latin writing.

13. (3) LIVY, Books XXI. and XXII. Latin writing. Collateral reading upon Roman history.

14. (3) TACITUS, GERMANIA AND AGRICOLA. PLATUS, CAPTIVI, OR TERENCE, PHORMIO. The history of Latin comedy. In connection with the study of the Germania, the accounts of early Teutonic institutions, given by Tacitus and Cæsar, are compared.

15. (3) HORACE. Selections from the Odes and Satires, read in such order as to show the ripening and mellowing of the poet's genius, as well as the development of his personality. Review of the period preceding the accession of Augustus; a study of conditions affecting the literature of the Augustan age; lectures upon the life and times of Horace; committing to memory of choice odes. Reading aloud with due attention to quantitive predominance becomes an important means of arousing an appreciation of the music of Horace's verse.

16. (3) PLINY'S LETTERS. The reading is accompanied by informal talks upon the life, private, social, and political, of Pliny's time. The pictures of the age given by Tacitus, Juvenal, and Pliny are compared and discussed.

17. (3) JUVENAL'S SATIRES. Illustrative material of every available sort is used to interpret the text, which is made the occasion of a somewhat detailed study of conditions under Domitian. Collateral readings upon topics suggested by the text and reports on such readings are required of all students. One day each week is devoted to an outline study of Roman literature, accompanied by lectures and illustrative reading from various authors.

Greek.

The elementary work in Greek (courses 1-4) is adapted to the requirements of college students who wish to begin Greek, and is done in the time usually assigned to it in colleges which offer elementary Greek.

High school students who have had two or three years of Latin may be admitted to these classes if their other work is so planned

as to allow the requisite time for preparation. Courses 5 to 8 present the work usually required for the A. B. degree.

1. (3) ELEMENTARY GREEK. Emphasis is placed on the necessity of thoroughly mastering the essentials of the grammar. The fact that the student has had at least two years' training in Latin enables him to observe the similarities and differences between Latin and Greek, the value of this comparative study being that it makes the new language appear less strange and thus contributes materially to the learner's progress. The correct placing of accents and breathings is gained by constant practice in writing Greek.

2. (3) ANABASIS, Book I. Composition; grammar. The modification of verbal stems, euphonic changes, and drill in the principal parts of irregular verbs claim special attention. The student's observation is directed to the principles of composition and derivation as an important aid in acquiring a vocabulary.

3. (3) THE ANABASIS, Books II., III., IV. Greek writing; grammar. A review is made of the work of the preceding courses. Reading from sight and from hearing is emphasized.

4. (3) HOMER, THE ILIAD, Books I., II., III.; selections from IV.-XXIV. The essentials of the structure of Homeric verse and the resemblances and differences between the Homeric and Virgilian hexameter are noted. The relation of the Epic to the Attic Greek and the essentials of Homeric syntax receive special attention. The study of words. Exercises in reading Attic Greek and in writing Greek.

5. (3) HOMER, THE ODESSEY, Selections from Books I.-XIII. The study of words. The "Homeric Question." Comparison of Homer and Virgil.

6. (3) PLATO. APOLOGY AND CRITO. XENOPHON, MEMORABILIA. Greek writing. Readings and discussions on (1) the rise of Greek philosophy, (2) Socrates and the Sophists, and (3) Plato and Socrates.

6a. (3) XENOPHON, SYMPOSIUM. PLATO, SELECTIONS FROM THE PROTAGORAS, GORGIAS, EUTHYDEMUS, AND REPUBLIC. The writing of Greek. Collateral reading. (Alternates with course 6.)

7. (3) SELECTIONS FROM LYSIAS AND DEMOSTHENES. The development of Attic oratory. Demosthenes' importance in Greek literature and history.

8. (3) SOPHOCLES, THE ANTIGONE AND ŒDIPUS TYRANNUS. The origin and development of the Greek drama. Outline study of the history of Greek literature.

Free-Hand Drawing.

The aim of this department is to give the student a good foundation in the rudiments of drawing. This foundation should enable the average student to express himself with some facility in various mediums and should serve at the same time as a preliminary training for the special student who wishes to do advanced work in drawing. While there are general courses planned for all students, the work is suited to the ability and taste of the individual as much as possible. A certain amount of elementary work is required of all, but after that has been satisfactorily done great liberty is allowed in the choice of medium and subject.

A general outline of the first three courses is something on this order:

1. (2) FREE-HAND DRAWING. Drawing in charcoal from casts of features, hands, feet, and simple heads, and of geometric solids; simple designs in color, such as panel, allover designs, rugs, book-covers, etc.; fifteen minute sketches from life.

2. (2) FREE-HAND DRAWING. Drawing in charcoal in outline and in light and shade from heads and architectural details; sketching from life in pencil and in pen and ink; designs for book-plates, headings, letterings, illustrations, etc., in pen and ink.

3. (2) FREE-HAND DRAWING. Charcoal drawing from casts of heads and figures and from heads from life; water color from still life and flowers, etc.; designs for vases, cups and saucers, wall paper, stained glass, etc.

In addition to this the students carry out posters and decorative compositions in color; illustrations; applied designs; oil from still life; sketching in color from models in costume, etc.

These courses are subject to change at any time to meet various requirements.

There will also be classes in arts and crafts, pottery, metal work, leather, wood carving, stenciling, etc., so far as there is a demand for such instruction.

Physical Culture.

The method of instruction pursued is not limited to any one system. Proper recognition is given to any method the whole or part of which have been found useful, or which promise efficacy. Consideration is given to hereditary tendencies and to individuality in physical possibilities, physical condition, and physical tastes. Individual training, therefore, is encouraged in every case, and especially where an examination discloses a student's inability to pursue

general or concerted exercises, either from threatened injury or inability to profit by such work.

Students upon entering the Institute are entitled without cost to a thorough physical examination. The examination includes accurate measurements of the physical proportions, a careful examination of the heart, lungs, and spine, and the strength of the principal groups of muscles; at the same time, information is solicited concerning heredity.

In every case where a defect is found in the boy's heart or lungs, he is advised to consult a physician, as the presence only, and not the degree of the defect is determined. Upon the basis of the information so gathered, instruction is given as to particular exercises and the use of various developing apparatus.

In addition to individual work, daily classes are given (commencing immediately after Thanksgiving Recess and continuing to the Easter Recess) in hygienic, educative, corrective, competitive, and recreative gymnastics, adapted as nearly as possible to the needs of individuals of all ages and physical conditions. The exercises so given are carefully graded as to progression, physiological effects, mechanical difficulty, and the boy's power of correct muscular co-ordination.

The boys' gymnasium contains a spacious exercise hall (90x40 feet), equipped with the most approved developing appliances, as well as apparatus for light and heavy gymnastics, hand-ball and basket-ball courts, shower and sponge baths, locker rooms and lockers, lavatories, visitors' gallery, and instructor's office.

The gymnasium is open from 9 a. m. to 7 p. m., every school day. Attendance is voluntary and free of cost to all. Classes are arranged at such hours as not to conflict with other school duties.

A separate gymnasium is provided for girls, and the courses of instruction outlined above are modified to meet the particular needs of girls.

Athletics.

During the Autumn and Spring Quarters out-of-door athletic games and sports are practiced under the personal supervision of the Instructor in Physical Culture. Only such games and sports are encouraged as the location, character, and athletic equipment of the school make it desirable and possible to pursue.

Students are not permitted to compete on athletic teams without first passing a satisfactory physical examination.

Requirements for Degree of Mechanical Engineer.

HIGH SCHOOL REQUIREMENTS OF CANDIDATES FOR DEGREE OF MECHANICAL ENGINEER, WITH SUGGESTED CURRICULUM

Autumn Quarter.	Course.	Credits.	Hours.	Winter Quarter	Course.	Credit.	Houss.	Spring Quarter	Course.	Credits.	Hours.
FIRST YEAR.											
***English**	1	2	1	**English**	2	2	1	**English**	3	2	1
Algebra	1	2	1	**Algebra**	2	2	1	**Algebra**	3	2	1
Physiography	2	2	2	**Physiography**	1	2	2	**Physiography**	2	2	2
Machine Sketching	1	2	2	**Wood Shop**	2	2	2	**Mechanical Draw'g**	5	2	2
SECOND YEAR.											
English	4	2	1	**English**	5	2	1	**English**	6	2	1
Geometry	4	2	1	**Geometry**	5	2	1	**Geometry**	6	2	1
German	A	2	1	**German**	B	2	1	**German**	C	2	1
Mechanical Draw'g	6	2	2	**Machine Shop**	19	2	2	**Machine Shop**	20	2	2
THIRD YEAR.											
American History	4	3	1	**American History**	5	3	1	**American History**	6	3	1
Physics	1	3	2	**Physics**	2	3	2	**Physics**	3	3	2
German	D	2	1	**German**	E	2	1	**German**	F	2	1
Forge Shop	3	2	2	**Foundry**	4	2	2	**Mechanical Draw'g**	10	2	2
FOURTH YEAR.											
English	7	3	1	**English**	8	3	1	**English**	9	3	1
Algebra	10	3	1	**Geometry**	11	3	1	**Trigonometry**	12	3	1
German	G	2	1	**German**	H	2	1	**German**	I	2	1
Pattern Shop	7	2	2	**Pattern Shop**	8	2	2	**Foundry**	9	2	2

COLLEGE REQUIREMENTS OF CANDIDATES FOR DEGREE OF MECHANICAL ENGINEER, WITH SUGGESTED CURRICULUM.

FIRST YEAR.											
English	10	3	1	English	11	3	1	**English**	12	3	1
Algebra	13	3	1	**Analyt'l Geometry**	14	3	1	**Analyt'l Geometry**	15	3	1
Chemistry	1	3	3	**Chemistry**	2	3	3	**Chemistry**	3	3	3
Mechanical Draw'g	12	2	2	**Machine Sketching**	11	2	2	**Machine Shop**	23	2	2
SECOND YEAR.											
Calculus	16	3	1	**Calculus**	17	3	1	**Calculus**	18	3	1
Physics, Mechanics	4	3	3	**Electrical Meas'mts**	6	3	3	**Heat and Light**	5	3	3
Descript. Geometry	25	2	1	**Kinematics**	28	2	1	**Steam Laboratory**	15	2	2
Surveying	13	3	2	**Forge Shop**	21	2	2	**Machine Shop**	24	2	2
THIRD YEAR.											
Chemistry	4	3	3	**Chemistry**	5	3	3	**Chemistry**	6	3	3
Statics	16	3	1	**Dynamics**	17	3	1	**Strength of Mator'ls**	18	3	1
Valve Gears	31	2	2	**Steam Eng. Design**	32	2	2	**Thermodynamics**	48	3	1
Electrical	35	3	2	**Electrical**	36	3	2	**Electrical**	37	2	2
FOURTH YEAR.											
Hydraulics	42	2	1	**Hydraulic Mach'ry**	47	2	2	**Structural Design**	38	2	2
Steam Boilers	44	2	1	Fuel & Gas Analysis	22	2	2	**Power Plant Tests**	49	2	2
Testing Machinery	46	2	1	Engine Tests	45	2	2	**Specifications and Contracts**	50	1	1
Power Measurem'ts	48	2	2	**Machine Design**	27	2	2				
Thesis	51	1	1	**Thesis**	51	3	2	**Thesis**	51	5	3

*Absolute requirements are indicated in heavy type.

COURSES OF INSTRUCTION. OTHER THAN ENGINEERING, FROM WHICH CURRICULA ARE CONSTRUCTED.

FIRST YEAR.

Autumn Quarter	Course.	Credits.	Hours.	Winter Quarter	Course.	Credits.	Hours.	Spring Quarter	Course.	Credits.	Hours.
English	1	2	1	English	2	2	1	English	3	2	1
Algebra	1	2	1	Algebra	2	2	1	Algebra	3	2	1
Physiography	2	2	2	Physiography	1	2	2	Physiography	2	2	2
Latin	1	2	1	Latin	2	2	1	Latin	3	2	1
German	A	2	1	German	B	2	1	German	C	2	1
Machine Sketching	1	2	2	Woodwork	2	2	2	Woodwork	2a	2	2
Freehand Drawing	1	2	2	Freehand Drawing	2	2	2	Freehand Drawing	3	2	2

SECOND YEAR.

English	4	2	1	English	5	2	1	English	6	2	1
Geometry	4	2	1	Geometry	5	2	1	Geometry	6	2	1
Ancient History	1	2	1	Ancient History	2	2	1	Ancient History	3	2	1
Latin	4	2	1	Latin	5	2	1	Latin	6	2	1
German	D	2	1	German	E	2	1	German	F	2	1
Woodwork	2b	2	2	Mechanical Drawing	5	2	2	Mechanical Drawing	6	2	2
Sewing	A	2	2	Sewing	B	2	2	Sewing	C	2	2

THIRD YEAR.

American History	4	3	1	American History	5	3	1	American History	6	3	1
Accounting	7	2	1	Accounting	8	2	1	Accounting	9	2	1
Physics	1	3	2	Physics	2	3	2	Physics	3	3	2
Latin	7	3	1	Latin	8	3	1	Latin	9	3	1
German	G	2	1	German	H	2	1	German	I	2	1
Spanish	1	2	1	Spanish	2	2	1	Spanish	3	2	1
Cooking	1	2	2	Cooking	2	2	2	Cooking	3	2	2

FOURTH YEAR

English	7	3	1	English	8	3	1	English	9	3	1
Algebra	10	3	1	Solid Geometry	11	3	1	Trigonometry	12	3	1
Chemistry	1	3	3	Chemistry	2	3	3	Chemistry	3	3	3
Domestic Economy	D	3	2	Domestic Economy	E	3	2	Domestic Economy	F	3	2
Latin	10	3	1	Latin	11	3	1	Latin	12	3	1
German	1	3	1	German	2	3	1	German	3	3	1
French	1	3	1	French	2	3	1	French	3	3	1

FIFTH YEAR.

English	10	3	1	English	11	3	1	English	12	3	1
European History	7	3	1	European History	8	3	1	European History	9	3	1
College Algebra	13	3	1	Analytical Geometry	14	3	1	Analytical Geometry	15	3	1
Chemistry	4	3	3	Chemistry	5	3	3	Chemistry	6	3	3
Biology	1	3	2	Biology	2	3	2	Biology	3	3	2
Domestic Economy	7	3	2	Domestic Economy	8	3	2	Domestic Economy	9	3	2
Latin	13	3	1	Latin	15	3	1	Latin	14	3	1
German	4	3	1	German	5	3	1	German	6	3	1
French	4	3	1	French	5	3	1	French	6	3	1
Greek	1	3	1	Greek	2	3	1	Greek	3	3	1

SIXTH YEAR.

English	12	3	1	English	14	3	1	English	18	3	1
Political Economy	10	3	1	Political Economy	11	3	1	Political Economy	12	3	1
Psychology	1	3	1	Ethics	3	3	1	Geology	4	3	1
Calculus	16	3	1	Calculus	17	3	1	Calculus	18	3	1
Physics	4	3	3	Physics	6	3	3	Physics	5	3	3
Chemistry	9	3	3	Chemistry	7	3	3	Chemistry	8	3	3
Physiology	4	3	2	Physiology	5	3	2	Physiology	6	3	2
Domestic Economy	G	3	2	Domestic Economy	H	3	2	Domestic Economy	I	3	2
Domestic Economy	10	3	2	Domestic Economy	11	3	2	Domestic Economy	12	3	2
German	7	3	1	German	8	3	1	German	9	3	1
French	7	3	1	French	8	3	1	French	9	3	1
Greek	4	3	1	Greek	5	3	1	Greek	6	3	1

SCHEDULE OF COURSES OF INSTRUCTION FOR YEAR 1905-06.

DAY COURSES	Room.	Autumn Quarter									Winter Quarter									Spring Quarter.								
		Hours and Courses									Hours and Courses									Hours and Courses.								
Instructors		8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4
Engineering																												
Chamberlain	7	25	25	31	—	..	48	—	..	..	..	28	32	—	..	45	—	..	..	..	..	..	..	..	..	..	..	..
DePuy	59	20—23		20—23		..	20—23		20—23		20—23		20—23		..	20—23		20—23		20—23		20—23		..	20—23		20—23	
Moseley	6	42	16	44—46		..	10—12		..	..	..	17	27—47		..	..	..	..	..	18	..	..	..	..	33—49—50			..
Ross	79	2	—	2	—	..	2	..	—	..	..	..	2	—	..	2—	7	7—	8	..	..	2	—	..	2—	7	7—	8
Hoyt	99	..	..	4	—	..	4	—	7	—	4	—	4	—	..	..	4	—	..	4	—	4	—	..	..	9	—	..
Bacon	D	3	—	3	—	..	..	3	—	..	3	—	3	—	..	..	3	—	..	3	—	3	—	..	..	3	—	..
Schenck	95	1	—	1	—	..	1	—	..	..	1	—	1	—	..	11	—	..	..	1	—	10—12		..	10—12		13	—
Hawley	96	6—10		5—	6	..	..	5—	6	..	6—10		6—10		..	..	5—	6	..	6—10		6—10		..	..	6—10		..
Nies	89	..	..	35	—	..	..	..	..	..	..	..	36	—	..	..	..	..	..	..	..	37	—	..	..	..	..	..
Wheeler	97	..	..	..	..	..	5—	6	..	..	..	..	..	..	..	5—	6	..	..	..	..	..	..	..	5—	6	..	..
McCabe	97	5	—	19	—	..	..	..	..	..	5	—	5	..	..	..	..	..	..	5	—	5	—	..	..	..	..	..
Havens	57	..	..	..	..	..	19	—	19	—	..	..	..	..	..	19	—	19	—	..	..	..	..	..	19	—	19	—
Kinney	75	..	..	..	..	..	..	..	..	..	2	—	..	..	..	..	..	..	..	2	—	..	..	..	..	..	..	..
Mathematics																												
Greeson	26	13	..	4	13	..	..	4	..	..	12	..	5	12	..	..	5	..	..	13	..	6	14	..	..	6	..	..
Mann	36	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..	..	..	..	11	..	..	..	..	..	..	..	..
Moseley	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	18	..	..	..	..	..	..	..
Studley	4	..	16	16	10	..	10	6	..	..	..	17	17	10	..	10	..	..	..	..	12	5	10	..	11	..	..	..
Thomas	38	..	1	6	4	..	3	11	..	..	..	1	..	5	..	13	11	..	..	14	2	..	6	..	5	..	..	..
Fertig	34	1	..	..	..	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	1	..	3	..	..	..
Pope	24	..	3	1	2	..	4	7	..	..	..	4	2	3	..	5	8	..	..	..	5	3	4	..	6	9	..	..
Wheeler	37	..	1	13	11	..	..	..	..	..	..	2	11	13	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Lay	28	10	4	1	—	..	1	—	..	..	1	5	2	—	..	2	—	..	..	2	3	..	3	..	2	3	..	..
Gill	46	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	—	..	..	..	..	..	..	..	..	..	..	..
Physics																												
Woodworth	55	..	1	1	1	..	..	..	..	..	..	2	2	2	..	..	..	..	..	..	3	3	3	..	..	..	..	..
Rogers	54	..	..	..	..	4	—	4	4	—	..	..	..	..	6	—	6	6	—	..	..	..	..	5	—	5	5	—
Nies	48	..	..	..	..	..	1	1	1	..	..	..	..	..	..	1	1	1	..	..	..	..	..	..	1	1	1	..
Chemistry																												
Smith	74	..	..	1	1	—	4	..	..	..	..	..	2	2	—	5,7	..	..	..	..	..	3	3	—	6,8	..	..	..
Trowbridge	66	A	A	4—	13	..	..	4—	13	..	B	B	5—	20	..	..	5—	20	..	C	C	6—	21	..	..	6—	21	..
Hora	68	1	—	A	..	..	1	—	1	—	2	—	B	..	..	2	—	2	—	3	—	C	..	..	3	—	3	—
Physiography																												
Peet	30	2	—	2	—	..	..	..	..	..	1	—	1	—	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Adams	39	..	..	..	..	..	2	—	..	..	..	..	..	..	..	1	—	..	..	..	..	2	—	..	2	—	..	..
Biology																												
Adams	46	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

DAY COURSES	Room.	Autumn Quarter. Hours and Courses.									Winter Quarter. Hours and Courses.									Spring Quarter Hours and Courses								
Instructors.		8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4	8	9	10	11	12	1	2	3	4
Domestic Economy																												
Smith	64	7	—	..	..	..	..	..	10	—	8	—	..	..	..	..	..	11	—	9	—	2	—	..	..	..	12	—
Ingersoll	83	..	A	A	—	..	D	—G	..	..	..	B	B	—	..	E	—H	..	..	..	C	C	—	..	F	—I	..	..
Hazzard	67	..	..	4	—	..	1	—	..	..	..	..	4	—	..	2	—	..	..	9	—	..	..	..	I	—	..	..
Foote	80	..	..	A	—	..	D	—G	..	..	..	..	B	—	..	E	—H	..	..	..	..	C	—	..	F	—I	..	..
Pitner	81	..	..	A	—	..	G	—	..	..	..	..	B	—	..	H	—	..	..	..	..	C	—	..	I	—	..	..
Philosophy																												
Adams	46	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..
History																												
Mann	36	..	2	..	3	..	4	7	..	..	..	..	..	5	..	5	8	..	..	..	..	..	6	..	6	9	..	..
Fertig	34	..	1	1	1	..	..	..	..	..	..	2	2	2	..	..	..	..	..	..	3	3	..	..	..	..	..	..
English																												
Lewis	5	..	10	10	12	..	..	..	..	..	..	11	11	14	..	..	..	..	..	..	12	18	15	..	..	..	..	..
Kohlsaat	32	..	..	4	7	..	..	4	1	..	..	..	8	5	..	..	5	2	..	..	..	..	6	..	1—8	6	8	..
Gustafson	29	..	..	..	..	..	1—7	..	..	..	..	..	..	..	..	8	..	..	..	..	..	..	..	..	..	..	..	..
Owen	27	..	..	1—6	7	..	4	..	1	..	..	..	7	8	..	5	..	2	..	..	1	8	..	..	6	..	3	..
Miller	21	..	..	..	..	..	4	7	1	..	..	..	..	1	..	5	8	2	..	..	..	..	..	..	6	3	2	..
Andrus	25	..	7	..	..	..	4	1	..	..	..	7	..	..	..	5	2	..	..	..	8	..	..	..	6	3	..	..
Williams	21	..	1	4	4	..	..	..	..	..	..	2	5	5	..	..	..	..	..	..	3	6	6	..	..	..	..	..
Woodle	22	..	1	..	..	..	4	..	1	..	..	2	..	..	..	5	2	..	..	..	3	3	..	..	6	..	..	..
Serven	19	..	..	..	..	..	..	16	16	..	..	..	..	..	..	..	..	16	16	..	..	..	..	..	..	..	..	..
German																												
Jones	41	..	4	7	1	..	4	..	..	..	..	5	8	2	..	5	..	..	..	..	6	9	3	..	6	..	..	..
Peet	42	..	D	A	D	..	D	1	..	..	..	E	B	..	..	E	2	..	..	..	F	C	..	..	F	3	..	..
Forster	45	..	A	..	A	..	A	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hohn	45	..	..	..	..	..	..	..	..	..	..	B	..	B	..	B	..	..	..	..	C	..	C	..	C	..	..	..
Latin																												
Nelson	47	..	13	4	10	..	1	1	..	..	..	15	5	11	..	2	..	..	..	6	..	9	12	..	8	..	..	..
Tenney	44	..	1	7	4	..	..	..	..	..	..	2	8	5	..	..	..	..	..	..	3	14	6	..	..	..	..	..
Street	40	..	4	1	..	..	..	..	..	..	..	5	..	2	..	..	..	..	..	..	6	..	3	..	..	..	..	..
Greek																												
Street	40	..	..	..	..	..	1	4	..	..	..	..	..	..	..	2	5	..	..	6	..	..	..	..	3	..	..	..
French																												
De Lagneau	20	4	A	7	1	..	D	..	..	..	5	B	8	2	..	E	..	..	..	6	C	9	3	..	F	..	..	..
Spanish																												
Staud y Ximenes	29	..	..	1	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..
Drawing																												
Blanke	86	..	1	—	3	..	1	—	3	..	..	2	—	4	..	2	—	4	..	..	3	—	5	..	3	—	5	..

Evening Session of 1906-7

October 8 to May 23

CALENDAR

FIRST TERM 1905				SECOND TERM 1906				THIRD TERM 1906			
Mon. & Wed.		Tues. & Th.		Mon. & Wed.		Tues. & Th.		Mon. & Wed.		Tues. & Th.	
OCTOBER				JANUARY				MARCH			
8	10	9	11	...	...	...	...	...	...	...	...
15	17	16	18	7	9	8	10	18	20	19	21
22	24	23	25	14	16	15	17	25	27	26	28
29	31	30	...	21	23	22	24	...	...	...	...
...	...	...	...	28	30	29	31	...	...	...	...
NOVEMBER				FEBRUARY				APRIL			
...	...	...	1	...	...	...	...	1	3	2	4
5	7	6	8	4	6	5	7	8	10	9	11
12	14	13	15	11	13	12	14	15	17	16	18
19	21	20	22	18	20	19	21	22	24	23	25
26	28	27	...	25	27	26	28	29	...	30	...
DECEMBER				MARCH				MAY			
...	...	...	...	...	...	...	...	...	1	...	2
3	5	4	6	4	6	5	7	6	8	7	9
10	12	11	13	11	13	12	14	13	15	14	16
...	...	18	...	...	...	...	...	20	22	21	23

The Institute is open from 6 to 10 o'clock Monday, Tuesday, Wednesday, and Thursday evenings.

The Library is open at 6 o'clock. Most of the instruction is given from 7:30 to 9:30. The courses are so arranged as to make it possible for a student to take one course and attend one or two evenings a week, or two courses and attend three or four evenings a week.

The tuition for one course of instruction, two evenings a week, for a term of ten weeks is five dollars; for two courses of instruction, four evenings a week, ten dollars.

In addition to the tuition, a fee of five dollars a term is charged for laboratory courses and for courses in the machine shop and in the wood shop.

Schedule of Evening Classes, 1905-1906

Instructors	Courses of Instruction	Room	Evenings	Terms
Abbott	Mechanical Drawing	98	Tue. & Th.	A. W. S.
Bacon	Forge Shop Practice	D	Tue. & Th.	A. W.
Bailey	Mechanical Drawing	96	Tue. & Th.	A. W. S.
Brown	Cookery	67	M. T. W. T.	A. W. S.
Davidson	Dietetics	64	M. T. W. T.	A. W.
DeLagneau	French	20	Mon. & Wed.	A. W. S.
DePuy	Machine Shop Practice	59	M. T. W. T.	A. W. S.
Havens	Machine Shop Practice	57	M. T. W. T.	A. W. S.
Hawley	Mechanical Drawing	96	Mon. & Wed.	A. W. S.
Heaney	Latin	40	Tu. & Th.	A.
Henning	Mechanical Drawing	78	Mon. & Wed.	A. W.
Hof	Mechanical Drawing	97	Tue. & Th.	A. W. S.
Hora	Chemistry	68	Tue. & Th.	A.
Hoyt	Foundry Practice	99	Mon. & Wed.	A. W. S.
Hulburd	Physics Laboratory	48	M. T. W. T.	A. W. S.
Jackson	English	22	M. T. W. T.	A. W. S.
Kane	Physical Culture	11	Mon. & Th.	A. W. S.
Kob	Mathematics	26	Tue. & Th.	S.
Lane	Electrical Laboratory	39	Mon. & Wed.	A. W. S.
McCabe	Machine Shop Practice	57	M. T. W. T.	A. W. S.
McGrew	Chemistry	68	Tue. & Th.	W. S.
Moll	German	41	Mon. & Wed.	A. W. S.
Morgan	Engineering Mathematics	7	Mon. & Th	A. W. S.
Moseley	Engineering Mathematics	2	Mon. & Th.	A. W. S.
Nies	Electrical Engineering	39	Tue. & Th.	A. W. S.
Omer	Mathematics	4	Tue. & Th.	A. W. S.
Rich	Mechanical Drawing	97	Mon. & Wed.	A. W.
Robbins	Mechanical Drawing	76	Mon. & Wed.	A. W. S.
Rogers	Electrical Engineering	39	Tue. & Th.	A. W. S.
Ross	Woodshop Practice	79	Tue. & Th.	A. W. S.
Schenck	Machine Design	78	Tue. & Th.	A. W. S.
Shaw	Accounting	24	Mon. & Wed.	A. W. S.
Smith	Chemistry	68	Tue. & Th.	A. W. S.
South	Arithmetic	28	Tue. & Th.	A. W. S.
Staud	Spanish	29	Mon. & Th.	A. W. S.
Thomas	Mathematics	38	Tue. & Th.	A. W. S.
Trowbridge	Chemistry	66	Tue. & Th.	A. W. S.
Tuck	Mathematics	37	M. T. W. T.	A. W. S.
Walters	English	21	Mon. & Wed.	A. W.
Weaver	Mechanical Drawing	76	Tue. & Th.	A. W. S.
Wheeler	Steam Engineering	B	Tue. & Th.	A. W. S.
Winters	Penmanship	24	Tue. & Th.	A. W.
Woodworth	Electrical Engineering	55	Mon. & Wed.	A. W. S.

Special Courses of Instruction in the Evening School.

The following courses in engineering are the outcome of a study of the needs of the men who have attended the evening classes of the Institute for several years past. The varied attainments and demands of journeymen, mechanics, power plant and locomotive engineers, electricians, clerks, laborers, foremen, shop superintendents, salesmen, book-keepers, firemen, and others who are in search of specific knowledge for which they have immediate use, are not to be met by the ordinary methods of class instruction. Except when the subject may be advantageously presented by lectures and laboratory demonstrations, the instruction of necessity becomes for the most part individual in character.

I. Electrical Engineering.

FIRST YEAR—AUTUMN TERM.

COURSE 1. Engineering Principles, Mechanics, Heat, and Light. Applied Physics 1 hour.

1 Mechanical stresses—Crane
2 Advantage and loss on incline plane
3 The foot pound—The engineer's unit
4 Prony brake testing
5 Efficiency of rope and chain tackle
6 Steam engine brake horse power
7 Stored energy-problems
8 Density and the pressure gauge
9 Mechanics of hydraulic elevator
10 Flow of water through pipes
11 Efficiency of a hydraulic ram
12 Design and test of a water motor
13 The atmosphere and condenser
14 Volume and pressure
15 Artificial heating
16 Heat unit and foot pound

17 Hidden heat of ice and steam
18 Steam tables and their use
19 Stored energy of fuel—Coal tests
20 Illumination and photometry

Mathematical Demonstration 1 hour.

1 Functions of angles
2 Right triangles—Arithmetical solution
3 Triangle of forces
4 Right triangles—Geometrical solution
5 Work and power problems
6 Work and efficiency
7 Falling bodies
8 Uniformly accelerated motion
9 Centrifugal force
10 Projectiles—Horizontal graphs
11 Projectiles—Vertical graphs
12 Projectile problems
13 Relative density
14 Velocity of efflux
15 Hydrostatics
16 Boyle's Law
17 Expansion by heat
18 Heat and work units
19 Steam
20 Refrigeration

FIRST YEAR—WINTER TERM.

COURSE 2. Engineering Principles, Electricity.

Applied Physics 1 hour.

1 The Volt—Method of producing
2 The Ohm—A property of matter
3 The Ampere—Its measurement
4 The electrical power unit
5 The electrical work unit
6 Incandescent camp efficiency
7 Problems in electric heating
8 Primary and secondary batteries
9 House wiring—National code
10 Open and closed arc lamps
11 Dynamo—Iron and copper losses
12 Characteristics of shunt generator
13 Special purpose dynamos
14 The D. C. electric motor
15 Electric power transmission

16 Principle of the transformer
17 High voltage and effects
18 Transformers and X-ray work
19 Central energy telephony
20 Wireless telegraphy

Mathematical Demonstration 1 hour.

1 The logarithmic curve system
2 Use of the slide rule
3 Electrical conductors
4 Voltage and resistance
5 Ohm's Law
6 The volt-ampere unit
7 Power calculations
8 Heat losses in conductors
9 Electro-plating and battery problems
10 Wheatstone bridge methods
11 Electrical efficiency
12 Counter E. M. F. of motors
13 Commercial efficiency
14 Resistance and conductivity
15 Transmission of power problems
16 Electrical measuring instruments
17 Street railway problems
18 Calculation of the magnetic circuit
19 Electromagnetic induction
20 Mathematics of the transformer

FIRST YEAR—SPRING TERM.

COURSE 3. Physics Laboratory, Mechanics, Heat, and Light.

1 Efficiency of a simple machine
2 Measurement of stresses in a simple crane
3 Parallelogram of forces—Tests
4 Determination of tackle efficiency
5 Use of planimeter on steam engine card
6 Determination of tenacity of iron and steel
7 Observation of elastic limits of metals
8 Horse power test of an electric motor
9 Power and efficiency tests of water motor
10 Determination of thermal capacity
11 Latent heat of ice
12 Latent heat of steam
13 Incandescent lamp—Electrical and heat energy
14 Heat efficiency of an electric stove
15 Fuel gas test—Calorimeter

16 Heat of combustion
17 Candle power distribution of incandescent lamp
18 Voltage—Candle power test of incandescent lamps
19 Mean spherical candle power of incandescent lamps
20 Lamp target test of a group of incandescent lamps

SECOND YEAR—AUTUMN TERM.

COURSE 4. Electrical Laboratory. Electrical Instruments.
1 Voltmeter—Calibration, potentiometer method
2 Voltmeter—Multiplier calibration
3 Voltmeter—Used as an ohmmeter
4 Voltmere—Line and machine insulation tests
5 Bridge—Construction and operation
6 Bridge—Commercial forms
7 Bridge—Measurement of condenser capacity
8 Bridge—Measurement of self induction
9 Galvanometer—Direct-reading ammeter scale
10 Galvanometer—Magnetic field
11 Millivoltmeter—Resistance determinations
12 Millivoltmeter—Milli-ampere scale
13 Millivoltmeter—Ammeter shunt calibration
14 Millivoltmeter—Conductivity tests
15 Recording Wattmeter—Copper losses
16 Recording Wattmeter—Reading and constant
17 Recording Wattmeter—Calibration and adjustment
18 Iron tester—Magnetizing force
19 Iron tester—Permeability of iron and steel
20 Iron tester—Magnetic flux and hysteresis

SECOND YEAR—WINTER TERM.

COURSE 5. Electrical Laboratory. D. C. Generators and Motors.
1 Dynamo—Distribution of potential
2 Dynamo—Determination of magnetic leakage
3 Dynamo—Iron and copper losses
4 Dynamo—Electrical efficiency
5 Motor—Electrical efficiency
6 Motor—Commercial efficiency, brake test
7 Motor—Starting torque
8 Motor—Induction factor
9 Generator—Magnetization curve
10 Generator—Shunt, load characteristic
11 Generator—Shunt, speed characteristic. Separate excitation
12 Generator—Shunt, speed characteristic. Self excited
13 Generator—Series arc, characteristic

14 Generator—Exploration of field
15 Generator—Efficiency curves
16 Generator—Armature losses
17 Generator—Compound, armature characteristic
18 Generator—Compound, load characteristic
19 Generators—Compound, parallel connections
20 Generators—Compound, operation in parallel

SECOND YEAR—SPRING TERM.

COURSE 6. Electrical Laboratory. Rotary Converter.
1 D. C. Generator—Total shunt load characteristic
2 D. C. Generator—Total series load characteristic
3 D. C. Generator—Total compound load characteristic
4 D. C. Generator—Differential load characteristic
5 D. C. Generator—Internal shunt characteristic
6 D. C. Generator—Motor efficiency, cradle method
7 A. C. Generator—Wave forms from slip rings
8 A. C. Generator—Instantaneous contact E. M. F. curve
9 A. C. Generator—Voltage diagram from slip rings
10 Armature—Connections bars to rings
11 Armature—Windings
12 Double Current Generator—Balancing set
13 Double Current Generator—Three wire system
14 A. C. Generator—Non-inductive load
15 A. C. Generator—with inductive load
16 A. C. Generator—Power factor
17 Rotary Converter—Efficiency D. C. to single phase A. C.
18 Rotary Converter—Efficiency D. C. to three phase A. C.
19 Rotary Converter—Efficiency single phase A. C. to D. C.
20 Rotary Converter—Efficiency two or three phase A. C. to D. C.

THIRD YEAR—AUTUMN TERM.

COURSE 7. Alternating Currents; Electrical Instruments.
1 Generation of alternating waves
2 Addition and subtraction of alternating waves
3 Average and effective values of sine waves
4 Power values of sine waves; power factor
5 Reactance of a choking coil
6 Calculations for a choking coil.
7 Reactance of a condenser
8 Circuits containing choking coil and condenser
9 Polar diagram; use of vectors
10 Addition of vectors; parallelogram law
11 Split waves; determination of power factor

12 Circuits containing resistance and reactance
13 Series circuits. Problems
14 Three voltmeter method of measuring power
15 Parallel circuits. Problems
16 Three ammeter method of meassuring power
17 Three voltmeter and three ammeter methods compared
18 Series parallel circuits. Problems
19 Magnetic circuits in iron and air
20 Design and test of a reactance coil

THIRD YEAR—WINTER TERM.

COURSE 8. Alternating Currents; Transformers and Transmission.

1 Series incandescent system
2 Measurement of high reactances
3 Calculation of reactances of cables and overhead lines
4 Single phase two wire transmission line
5 Single phase three wire transmission line
6 Two phase three wire transmission line
7 Two phase four wire transmission line
8 Three phase three wire transmission line
9 Three phase four wire transmission line
10 Transformer; voltage and current ratios
11 Transformer; exciting current and impedance
12 Transformer diagram; leading, lagging, and noninductive loads
13 Transformer regulation. Problems
14 Transformer magnetic circuits
15 Transformer hysteresis loss
16 Transformer installations; series and parallel
17 Transformers for arc lighting
18 Polyphase transformation; Scott connection
19 Polyphase transformation; two phase to six phase
20 Polyphase transformation; three phase to six phase

THIRD YEAR—SPRING TERM.

COURSE 9. Alternating Current Machinery.

1 Polyphase induction motor; rotary field
2 Polyphase motor; starting torque
3 Polyphase motor; compensator starting. Problems
4 Polyphase motor; rheostatic control. Problems
5 Circle diagram; power factor, input efficiency
6 Circle diagram; torque, slip, output
7 Single phase induction motor; starting conditions

8 Single phase induction motor; running conditions
9 Induction wattmeter
10 A. C. Generator; armature windings
11 A. C. Generator; armature reaction
12 A. C. Generator; synchronous impedance
13 A. C. Generator; regulation
14 A. C. Generators in parallel
15 Synchronizing; methods and tests
16 Synchronous motor; effects of strong and weak fields
17 Synchronous motor generators
18 Rotary converter voltage and current ratios
19 Rotary converter; heating and output
20 Rotary converters in sub-stations

II. Shop Engineering.

These courses are designed to give a workman already skilled in his particular line that information on general work which he should have to enable him to become an intelligent foreman or shop superintendent. The courses have as their aim the training of men in the principles of shop work and drawing, the mathematics and elementary mechanics of shopwork, costs, and the relations of departments.

FIRST YEAR—AUTUMN TERM.

COURSE 1. Mechanical Drawing.

1 Conventional signs, etc., used in machine drawing
2 Bolt threads, standard screws
3 Standard bolt heads and nuts
4 Sectioning by various methods
5 Preparation of drawings for the shop; tracing, blue printing, etc.
6 Strength of bolts, use of tables
7 Standard screws and rivets
8 Standard keys and key seats
9 Finish marks and directions for the machine shop
10 Dimensioning, pattern numbers, filing of drawings, etc.
11 Bosses and hubs
12 Pulley arms and rims
13 Morse tapers and other standard tapers
14 Set screws and collars
15 Standard pipe and pipe threads
16 Clamping rings
17 Bearings and bearing surfaces

18 Babbitt bearings
19 Bushings
20 Oil grooves and oiling arrangements

FIRST YEAR—AUTUMN TERM.

COURSE 2. Engineering Principles, Mechanics, Heat, and Light. This course is the same as Course 1 in Electrical Engineering.

FIRST YEAR—WINTER TERM.

COURSE 3. Mechanical Drawing
1 Gearing, nomenclature, etc.
2 Involute and cycloid gearing
3 Spur gearing
4 Bevel gearing and mitre gears
5 Worm gearing
6 Bushings
7 Proportioning of sections to avoid casting strains
8 Comparative strength of different shaped sections
9 Comparative strength of the same section made of different materials
10 Shafting calculations
11 Design of cone pulleys
12 Horse power of gears and belting
13 Globe, angle, gate, and check valves
14 Flange couplings
15 Shaft couplings in general
16 Thrust bearings
17 Universal joints
18 Knuckle joints
19 Ratchets
20 Design of ratchet drill

FIRST YEAR—WINTER TERM.

COURSE 4. Engineering Principles. Electricity. This course is the same as Course 2 in Electrical Engineering.

FIRST YEAR—SPRING TERM.

COURSE 5. Mechanical Drawing.
1 Design of reamers, taps, etc.
2 Design of drill press
3 Lathe details
4 Steam engine design in general
5 Cylinder and piston of steam engine
6 Piston rod and method of fastening to piston
7 Cross head, stuffing boxes

8 Connecting rod
9 Crank shaft
10 Main bearings
11 Frame
12 Valves
13 Fly wheel
14 Eccentrics and valve gear
15 Gas engine design
16 General design of cylinder, piston, etc.
17 Cross head and connecting rod
18 Crank shaft and frame
19 Design of valves and valve gear
20 Calculation for fly wheel

FIRST YEAR—SPRING TERM.

COURSE 6. Shop Mathematics and Mechanics. Laboratory practice and demonstration.

1 Measurement of water, water meter test
2 Weight and volume of water, measurement of tanks
3 Use of micrometer
4 Testing of wire gauges.
5 Use of vernier
6 Weights of various metals, specific gravity
7 Weights of castings by various methods
8 Use of planimeter, measurement of areas by various methods
9 Efficiency of simple pulleys
10 Efficiency of compound pulleys
11 Measurement and testing of screws, screw gauges, etc.
12 Sheet metal and wire gauges
13 Efficiency of screws
14 Dimensions and pitch of gears
15 Gear and rack
16 Efficiency of gearing
17 Compound gearing
18 Pulleys and shafting
19 Cone pulleys
20 Belting

SECOND YEAR—AUTUMN TERM.

COURSE 7. Foundry Work.

1 Foundry construction, equipment
2 Tempering sand, mixing facings, and general instructions in molding
3 Core-making, core-ovens, core sand, and core binders; practice in making plain cores

4 Cupola construction and management, charging cupola and melting iron

5 Follow-boards, sand and plaster matches, practice in floor and bench molding

6 Making and venting sand beds, practice in bedding in

7 Warping and twisting of castings, causes and prevention, straightening crooked castings

8 Shrinkage, contraction, feeding head, making three part molds, making heat

9 Pattern stretching problems, molding same

10 Pattern stretching problems, molding same

11 Pressures in mold, rules for estimating; making molds requiring special rigging

12 Estimating weight of casting from patterns or drawing, emergency work

13 Sheave pulley molding from split patterns showing principles involved; making cupola heat

14 Belt pulley molding from full patterns of various types

15 Belt pulley molding from sweeps, cores, and segments of patterns

16 Mending broken castings and other emergency work

17 Molds for covers, kettles, face-plates, etc., from sweeps and templates without patterns

18 Molding machines and special equipment for duplicate work

19 Art bronze, statue, and tablet making from plaster patterns and casts

20 Blast furnace practice and visit to furnace plant

SECOND YEAR—AUTUMN TERM.

COURSE 8. Shop Mathematics and Mechanics

1 Length of stock required for making bent shapes

2 Toggle joint

3 Screw cutting gearing

4 Worm gearing

5 Milling machine calculations

6 Expansion in metals, shrinkage in castings, etc.

7 Strength of wire, tensile strength

8 Strength of beams

9 Use of pressure gauges, pressure of metal in molds, etc.

10 Shrinking and shrink fits

11 Stock calculations for forgings

12 Horse power calculations for engines and motors

13 Cranes

14 Motor tests for efficiency

15 Differential pulleys
16 Pulling power of pulleys
17 Brake tests of machines
18 Effects of gearing
19 Jib crane
20 Use of milling machine tables, spiral milling, etc.

SECOND YEAR—WINTER TERM.

COURSE 9. Machine Shop Practice

1 General description and operation of machine tools
2 Characteristics of different types of cutting tools, grinding tools
3 Centering and plain turning, roughing and finishing cuts
4 Scales, calipers, and measuring instruments
5 Thread cutting
6 Cutting speeds for different materials, use of high speed steels
7 Speed lathe work, hand-tool turning, polishing, knurling, drilling, etc.
8 Laying-out work
9 Drill press work, grinding drills
10 Special work on drill press, securing work, use of angle plates, etc.
11 Drilling in the engine lathe, use of flat drills, drill rests, etc.
12 Taper turning, use of compound rest, taper attachment, etc.
13 Chuck work, use of three and four jaw chucks
14 Boring bars and tools
15 Face plate work, centering, etc.
16 Working in brass, grinding of tools, etc.
17 Cold chisels, chipping
18 Files and filing
19 Scraping, polishing, and finishing surfaces by hand
20 Tapping and reaming by hand and machine

SECOND YEAR—WINTER TERM.

COURSE 10. Shop Mathematics and Mechanics.

1 Tensile tests of steel
2 Strength of ropes
3 Strength of chains
4 Holding power of screws and nails
5 Holding power of nuts and bolts
6 Strength of pipe threads
7 Compression tests of different materials
8 Ties and struts

9 Shearing strength of rivets
10 Torsion tests
11 Strength of beams
12 Strength of columns
13 Foundry tests of cast iron, Keep transverse test
14 Foundry tests of cast iron, impact test
15 Comparative strength of different materials of the same section
16 Holding power of hooks
17 Simple trusses
18 Elasticity
19 Standard specifications for steel
20 Specifications

SECOND YEAR—SPRING TERM.

COURSE 11. Pattern Shop Practice.

1 Warping of lumber and effect on patterns
2 Shrinkage, double shrink, and finish
3 Solid patterns and green sand cores
4 Draft, fillets, and dowels
5 Solid patterns with core prints and dry sand cores
6 Core boxes
7 Split patterns, draw plates, rapping plates, etc.
8 Built up patterns, built up face plate and segment work
9 Varnishes, waxes, etc., for finishing wood and metal patterns
10 Gear patterns and different methods of making
11 Interchangeable pattern parts and core prints
12 Pattern shop machinery and special tools used in pattern making
13 Stop-offs and methods of holding thin patterns in shape
14 Architectural pattern making
15 Drawings for pattern makers
16 Sweeps for loam work
17 Skeleton patterns and core boxes
18 Systems of pattern storage and marking
19 Pattern shop costs
20 Relation of pattern shop to foundry and machine shop

SECOND YEAR—SPRING TERM.

COURSE 12. Forkge Shop Practice.

1 Heating and hardening of tool steel
2 Tempering in general, and forging and tempering of cold chisels
3 Simple lathe tools, forging and tempering

4 Side, finishing, and boring tools
5 Oil and lead bath tempering
6 Making and tempering of springs
7 Tempering of milling cutters
8 Welding in general
9 Chain making
10 Making of hooks, eye bolts, etc., solid and welded
11 Brazing
12 Various methods of case hardening
13 Making of weldless rings and die forgings
14 Fork and knuckle joint forgings
15 Forgings with bosses or projections
16 Crankshaft and connecting rod forgings
17 Electric welding
18 Tempering of thin and long slender shapes
19 Tempering of taps, reamers, etc.
20 Use of bending jigs

THIRD YEAR—AUTUMN TERM.

COURSE 13. Machine Shop Practice.

1 Plain shaper work, chucking, and form of tools
2 Dove tail and bevel work in shaper
3 Planer work on flat surfaces
4 Setting up of work on planer, use of surface gauge, etc.
5 Plain milling on flat surfaces
6 Gang and slot work on the milling machine
7 Use of index centers, fluting of taps, reamers, etc.
8 Spur gear cutting
9 Bevel gear cutting
10 Spiral milling, thread cutting, etc., on the milling machine
11 Cutting worms and worm wheels
12 Compound and differential indexing
13 Accurate drilling of jigs, etc., on the milling machine
14 Use of test and speed indicators on machines
15 Use of drilling jigs
16 Use of boring bar in lathe and milling machine
17 Boring of deep holes, use of cannon and oil hole drills
18 Use of cutter grinder, grinding of cutters, etc.
19 Use of universal grinder
20 Grading of emery cloth and wheels, selection of emery wheels

THIRD YEAR—AUTUMN TERM.

COURSE 14. Machine Design and Cost Estimates

Relation of different departments, use of graphic representation

and charts to show responsibility; division of costs; different elements entering into costs; different methods of approximating costs; rough estimating of cost per pound of castings and forgings; methods of handling work; tracing and checking; piece work systems; premium systems; material and cost estimates on various pieces of work.

This course will be given in connection with a course in advanced machine design. Machine design work will be machine tool design on such tools as lathes, shapers, jigs, etc.

THIRD YEAR—WINTER TERM.

COURSE 15. Machine Shop Practice

1 Key-seating by planing
2 Key-seating on milling machine, Woodruff keys
3 Screw machine work, forms of tools used
4 Setting of taps, dies, formed tools, etc., on the screw machine
5 Hand tool work in the lathe
6 Buffing and polishing wheels, cutting of self hardening steel
7 Standards for taper drill shanks, centers, milling cutter, arbors, etc.
8 Lapping of flat and round surfaces
9 Lining up of machines and shafting
10 Testing of machine tools for accuracy of adjustment
11 Babbitt bearings and grades of babbitt
12 Drill and screw gauges
14 Special tools used on planer and shaper, goose neck, "T" slot, etc.
15 Use of steady rest, cat-head, and follow rest
16 Straightening shafting, etc.
17 Use of relieving attachments
18 Die making
19 Standard and limit gauges
20 Manufacturing interchangeable parts

III. Steam Engineering.

Two courses in the operation and commercial testing of power plant apparatus. Each course will begin with a brief description of the principles involved, the object sought, and the method to be employed.

AUTUMN AND SPRING TERMS.

COURSE 1. Elementary. Subjects considered: Work and power; various forms of Prony brake; commercial efficiency of electric motor; calibrations of platform scales and steam gauges; sensible,

specific, and latent heat; the steam tables; per cent of moisture in steam; Napier's rule; tests of injectors for steam consumption, duty and efficiency; tests of steam pumps; calculated capacity of boilers, pumps, and condensers; evaporation test of boiler.

WINTER TERM.

COURSE 2. Advanced. Subjects considered: Engine measurements and calculated horse power; the slide valve; clearance; the indicator card, the planimeter, friction load of engine, mechanical efficiency of engine, water consumption from the indicator card; efficiency of different cut offs; power plant test; tests of lubricating oils; tests of cement; determination of the strength of materials in tension and compression; theory and operation of the air compressor; test of refrigeration plant.

IV. Engineering Mathematics.

AUTUMN, WINTER, AND SPRING TERMS.

Algebra, geometry, trigonometry, and plotting applied to engineering problems. Course 1 in Electrical Engineering, practical mathematics, or its equivalent is required as a prerequisite for this course, which is undertaken with the purpose of carrying the student further in mathematics and the application of mathematics to engineering problems. Much attention is given to graphical processes—their use in the study of forces, velocities, solution of equations, interpolation, mensuration, etc.

This course is planned to be of value to those who, in design, operation, or test, find that simple mathematical and graphical work gives them trouble.

V. Chemistry.

AUTUMN, WINTER, AND SPRING TERMS.

COURSE 1. Practical Chemistry. The first year is designed to give work which will more nearly meet the needs of night students than does the customary course in general chemistry. With this end in view a course has been outlined which not only gives the fundamental principles of the subject as thoroughly as any elementary course can give them, but in which the laboratory work illustrating these principles is chosen from the operations and manipulations in daily use in the technical laboratory. It is believed that this course will be of immediate benefit to any one who is employed in any industry which involves chemical operations and

that it will serve as the best possible introduction to advanced work in technical chemistry.

COURSE 2. Qualitative Anaylsis. The work of the second year is the customary course in qualitative analysis. It consists entirely of induvidual work in the laboratory and personal consultation with the instructor. The amount of time required for its completion will vary with the previous preparation and the industry and aptitude of the student. The preparation required of those who take this work is the course in practical chemistry or any good course in general chemistry.

COURSE 3. Quantitative Analysis. As soon as a student has finished this course in qualitative analysis, or its equivalent elsewhere, he may begin quantitative analysis. This work starts with simple gravimetric and volumetric determinations, which lead up to the more complex determinations and separations required in technical analysis.

University Extension Lectures.

In 1905-06 the following lectures were given at the Institute on Thursday evenings:

FROM SOCIAL UTOPIAS TO PRACTICAL POLITICS.—By John Graham Brooks, A. B., Professorial Lecturer in Social Economics, University of Chicago.

October 5.—The First Great Utopia.
October 12.—Utopias in the Name of Christ.
October 19.—From Fourier to Brook Farm.
October 26.—The Utopia of Trade Unionism.
November 2.—The Utopia of the Socialists.
November 9—The Best of Them All.

AMERICAN LITERATURE.—By Richard Burton, Ph. D., Professorial Lecturer in English Literature, University of Chicago.

November 16.—Before the Republic.
November 23.—Irving and the Essay.
November 30.—Cooper and the Romance.
December 7.—The New England Group.
December 14.—Poetry: From Poe to Whitman.
December 21.—The Latter-Day Novel.

THE SLAVIC WORLD.—By Edward A. Steiner, Lecturer on Slavic History, and Professor of Applied Christianity, Iowa College.

January 4.—A Journey Through the Slavic World.
January 11.—The Characteristics of the Slav.
January 18.—Law and Customs Among the Slavs.
January 25.—Feasts and Fasts Among the Slavs.

February 1.—Religious Life Among the Slavs.

February 8.—The People of the Slavic World (illustrated).

THE MASTER WRITERS OF THE BIBLE.—By Herbert L. Willett, Ph. D., Assistant Professor of the Semitic Languages and Literature, University of Chicago.

February 15.—Isaiah, theProphet-Statesman.

February 22.—Jeremiah, the Prophet-Martyr.

March 1.—The Author of Job, Poet and Philosopher.

March 8.—Luke, the Beloved Physician.

March 15.—Paul, the Defender of the Faith.

March 22.—The Author of Hebrews, the First Christian Apologist.

OTHER WORLDS THAN OURS.—By Forest Ray Moulton, Ph. D., Assistant Professor of Astronomy, University of Chicago.

March 29.—Our Nearest Neighbor—the Moon.

April 5.—The Earth-Like Planets—Mercury, Venus, and Mars.

April 12.—The Great Planets—Jupiter, Saturn, Uranus, and Neptune.

April 19.—The Sun Comets, and Meteors.

April 26.—The Nebular Hypothesis.

May 3.—The Sidereal Universe.

These lectures were fully illustrated with stereopticon views made from photographs taken at the Lick and Yerkes Observatories.

The following courses are announced for Thursday evenings from October 4 to March 28, 1906-07

OUR NATURAL RESOURCES—THEIR ECONOMIC SIGNIFICANCE—Six illustrated lectures by Prof. John Paul Goode.

THE LIFE OF CHRIST—Six lectures by Prof. Herbert L. Willett.

CONTEMPORARY POETIC DRAMA—Six lectures by William Norman Guthrie.

MEN WHO MADE THE NATION—Six lectures by Prof. Edwin Earle Sparks.

A fifth course not yet chosen will be given at this center.

Summer Session of 1906.

July 2 to August 10.

The Summer work is designed:

1. For the students of the Institute who remain in the city during the summer and who may with profit devote to study a part of the long vacation.

2. For students in other schools who may wish to take advantage of the laboratory and shop equipment of the Institute by pursuing special courses in science and the practical arts.

3. To enable students who have fallen behind in the work of the year to make up deficiencies. Review classes are formed covering the work of the last year of the grammar school and each year of the high school in English, mathematics, history, and German.

Any course of instruction offered by the Institute will be repeated during the summer if the demand is such as to justify the formation of a class.

The tuition for the summer term for a course in one subject, five hours a week of class instruction, is five dollars. In laboratory, drawing, and shop work, ten hours, or a fraction thereof, counts as five in determining the tuition.

In chemistry a deposit of two dollars is required to cover charges for breakage. In Manual Training, courses *a*, *b*, and *d*, and in Cooking a charge for materials used will be made.

Courses of Instruction.

English.

Reading, Grammar, and Composition. A course in elementary English in preparation for admission to the Institute.

Literature and Composition. (a) A review of the required English of the first year.

(b) A review of the required English of the second year.

(c) The "reading-books" required for college entrance in 1906.

(d) The "study-books" required for college entrance in 1906.

Mathematics.

ARITHMETIC. An elementary course in preparation for admission to the Institute.

ALGEBRA. (a) A review of the algebra of the first year.

(b) A more advanced and thorough study through quadratic equations.

(c) COLLEGE ALGEBRA. The binomial theorem, undetermined coefficients, introduction to the theory of equations.

GEOMETRY. (a) An elementary course in plane geometry.

(b) Plane geometry reviewed and completed, with special emphasis on original problems and demonstrations.

(c) The demonstration of theorems and the solution of problems in solid geometry.

TRIGONOMETRY. Plane trigonometry with an introduction to spherical trigonometry.

PLANE ANALYTICAL GEOMETRY.

CALCULUS. The elements of differential and integral calculus with applications to the integrations most frequently required in engineering subjects.

History.

UNITED STATES HISTORY. (a) An elementary course in preparation for admission to the Institute.

(b An advanced course with special attention to the sources and formation of the Constitution, its operation, and the history of political parties.

ENGLISH HISTORY from the Norman conquest to the present time.

GRECIAN HISTORY from the Persian Wars to the death of Philip of Macedon.

ROMAN HISTORY from the Punic wars to the death of Ceasar.

EUROPEAN HISTORY. (a) An outline course covering the period between ancient and modern times.

(b) An outline course in the history of Modern Europe.

Modern Languages.

Such elementary and advanced classes as may be necessary to meet the demands of the students in attendance.

Chemistry.

All courses are designed to meet as far as possible the wants of each student.

GENERAL CHEMISTRY. (a) High School course.

(b) College course.

QUALITATIVE ANALYSIS.

QUANTITATIVE ANALYSIS. Analysis of foods, etc.

ORGANIC CHEMISTRY. General laboratory work.

Physics and Engineering.

GENERAL PHYSICS. (a) An elementary course designed to meet the needs of high school students and medical students who have entrance requirements to make up. Recitations and laboratory work.

(b) An advanced course suitable for teachers and others who wish a college course in physics. As the work is largely individual in character, considerable latitude will be allowed to a student in choosing the particular line of work he wishes to pursue.

ELECTRICAL ENGINEERING. The Institute equipment furnishes ample opportunity for the study of electrical engineering. The courses in this department will be arranged to suit the individual student.

STEAM ENGINEERING LABORATORY (ENGINEERING 15). A course in the operation and testing of the various parts of a steam plant, calibration of gauges and indicators; measurements and calculated capacity of boiler, engines, etc.; tests for efficiency and economy.

Manual Training and Pattern Making.

(a) A course designed for teachers in the primary and grammar grades. Instruction and models suitable for young pupils in constructive work in wood. Special attention given to the application of simple arithmetic and plane geometry in the laying out of problems involved. Students in this course wishing to take drawing in designing of models parallel with shop work may do so. Students are required to furnish drawing instruments and paper.

(b) A course designed for boys 10 to 14 years old. The use and application of the ordinary bench tools, with instruction suited to each member of the class.

(c) Bench work and turning as defined under Engineering 2 in the Annual Register.

(d) A course in the design and construction of "Arts and Crafts" furniture will be offered to those who have sufficient experience in the use and care of tools.

(e) A course in pattern making designed for those who have successfully completed the regular course for beginners, or its equivalent.

Drawing and Shop Practice.

MECHANICAL DRAWING. (a) A course in elementary drawing, dealing with the proper use of the instruments, and teaching stand-

Mathematics.

ARITHMETIC. An elementary course in preparation for admission to the Institute.

ALGEBRA. (a) A review of the algebra of the first year.

(b) A more advanced and thorough study through quadratic equations.

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(b) Plane geometry reviewed and completed, with special emphasis on original problems and demonstrations.

(c) The demonstration of theorems and the solution of problems in solid geometry.

TRIGONOMETRY. Plane trigonometry with an introduction to spherical trigonometry.

PLANE ANALYTICAL GEOMETRY.

CALCULUS. The elements of differential and integral calculus with applications to the integrations most frequently required in engineering subjects.

History.

UNITED STATES HISTORY. (a) An elementary course in preparation for admission to the Institute.

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ROMAN HISTORY from the Punic wars to the death of Ceasar.

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All courses are designed to meet as far as possible the wants of each student.

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(b) An advanced course suitable for teachers and others who wish a college course in physics. As the work is largely individual in character, considerable latitude will be allowed to a student in choosing the particular line of work he wishes to pursue.

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(b) A course designed for boys 10 to 14 years old. The use and application of the ordinary bench tools, with instruction suited to each member of the class.

(c) Bench work and turning as defined under Engineering 2 in the Annual Register.

(d) A course in the design and construction of "Arts and Crafts" furniture will be offered to those who have sufficient experience in the use and care of tools.

(e) A course in pattern making designed for those who have successfully completed the regular course for beginners, or its equivalent.

Drawing and Shop Practice.

MECHANICAL DRAWING. (a) A course in elementary drawing, dealing with the proper use of the instruments, and teaching stand-

ard methods of lettering and conventional methods of representing screws, bolts, nuts, etc. Drawing of simple objects.

(b) A course in projection drawing. Explanation and use of the planes of projection, development of sheet metal surfaces, and making of projection drawings from perspective sketches. Tracing on cloth.

(c) A course in elementary machine design, making of working drawings of machine parts from rough dimensioned sketches, and the simpler forms of design. Tracing.

More advanced machine design if desired.

MACHINE SHOP PRACTICE. A course embodying a study of the construction of the different machine tools with instruction in operating and keeping them in order. Practice in centering, plain, taper, and templet turning, chucking, drilling, boring, external and internal thread cutting; hand tool turning, filing and polishing. Forms of cutting tools, and instruction in grinding. Use of planer, shaper, and universal miller, and grinder; plain milling and cutting of spur and bevel gears.

FOUNDRY WORK. The instruction in foundry work is largely individual, the complete equipment of the shop making it possible to give such work as each student desires and needs. One may specialize in cupola and furnace work, in core making, in art bronze and brass work, or in light or heavy machinery molding. Special attention will be given to a course for teachers of manual training.

Domestic Economy.

COOKING. The aim of the course is to give a knowledge of the composition of foods and of the principles which underlie their preparation for use in the body. Laboratory practice in cooking, and simple experimental work with foods.

SEWING. Practice in hand and machine sewing. Talks on materials used. Cutting and making of plain garments. Use of patterns,

General Assemblies, 1905-1906.

Sept. 27. Chapel. Address by Director Carman: "The New Year."

Oct. 11. Allen C. Lewis Society. Address by President Gunsaulus of Armour Institute: "The Engineering Type of Mind."

Oct. 25. Chapel. Address by Mr. E. B. Groot: "The Outlook in Athletics."

Nov. 8. Allen C. Lewis Society. Debate by College Freshmen: "*Resolved*, That Chicago aldermen should be elected on a general ticket without regard to ward boundaries."

Dec. 6. Chapel. Address by Governor George H. Utter of Rhode Island: "Instruments of Success."

Dec. 13. Allen C. Lewis Society. Addresses by Fourth Year Students: "*Resolved*, That the saloons of Chicago should be closed on Sunday."

Jan. 12. Memorial exercises in honor of President William Rainey Harper. Addresses by Judge C. C. Kohlsaat, Director G. N. Carman, Mr. Thomas Kane, Hon. Oliver H. Horton, Dr. James B. Herrick, and Professor E. H. Lewis.

Jan. 17. Allen C. Lewis Society. Literary and Musical Exercises.

Jan. 31. Chapel. Address by Judge Orrin C. Carter: "A New Charter for Chicago."

Feb. 21. Concert by the Musical Organizations.

March 14. Allen C. Lewis Society. Debate by Fourth Year Students: "*Resolved*, That the American Negro should be colonized."

April 4. Chapel. Address by the Rev. Jenkin Lloyd Jones: "Municipal Problems."

April 18. Allen C. Lewis Society. Debate by Fourth Year Students: "*Resolved*, That egoism is more conducive to human progress than altruism."

May 2. Chapel.

May 16. Allen C. Lewis Society. Debate by Fourth Year Students: "*Resolved*, That the American army and navy should be materially increased."

June 20. Finals in Public Speaking. "Some City Problems," a symposium by Arthur Bernard Krock, Cherrill Isabella Wells, Frederick Falls, Nelle Gill, James Aloysius Rafferty, Robert Rollins Mix, Grace Lucile Hennecke, Charles Kob.

Students in Attendance, 1905-1906.

The names of students taking evening, summer, or special courses are not included in these lists.

The figures after the names indicate the number of credits obtained by the end of the Winter Quarter, March 23, 1906, and completed without conditions, or granted on advanced standing. For definition of credit see page 16.

College Students.

Where no credits are entered, credentials for work done elsewhere have not been presented and recorded.

Engineering.

	College Credits
Adams, Charles W	50
Allen, Frank S	52
Allured, Karl	
Arp, Clarence K	
Attley, Emmett G	
Badger, Arthur H	
Badger, Henry S	
Bang, Homer	
Bauerle, Walter E	
Becker, Walter	26
Bergmann, Ernest	40
Borg, Charles	57
Buechner, William A	40
Byron, Frank	14
Carpenter, Charles I	
Caul, Roy C	
Cohn, David	26
Dieckman, Albert	25
Duclos, Aeneas	
Filkins, Earl R	
Fitzsimmons, James A	59
Fonda, Charles J	35
Freeman, Clinton H	
Gilbert, Harry N	68
Gregg, Harold E	16
Greenberg, Jacob	
Grimwood, Sidney	
Grossberg, Arthur	15
Haber, Charles	77
Hackett, Charles	
Hall, Arthur	12
Hall, John P	72
Hansen, Edwin O	31
Harlev, Arthur	10
Harris, Charles	
Havens, Fred L	48
Havlik, Robert F	64
Hayes, William H	
Huge, Wilfred J	8
Hunter, Vincent	81

Hutton, William C.....
Jessup, John M.....
Johnson, Birger L.....
Johnson, George A.....
Jordan, Irving..... 16
Kaindl, Arthur..... 8
Kane, Joseph..... 75
Kilner, Harold..... 55
Kilner, Ralph H..... 43
Kinney, William M..... 94
Kob, Charles..... 79
Koelling, Adolph.....
Kohout, Jerome.....
Kopf, Melrose G..... 25
Lamb, Carter H.....
La Montaine, Sidney J.....
Lane, Frank G.....
Lee, Alexander..... 12
Lemmon, Crawford..... 33
Levey, Clarence..... 28
Lewis, Webster J.....
Libberton, Herbert..... 41
Libbey, Herbert..... 22
Lynch, William E.....
Maginnis, Emmet..... 12
Martin, Edward P..... 21
McDaniels, Frank L..... 12
Mitchell, Harry.....
Moffett, Frank E.....
Moore, George R.....
Moore, Roy S.....
Morgan, Edward J..... 28
Morris, Paul J..... 22
Muench, George W..... 28
Patitz, George..... 10
Perlow, Arthur R..... 12
Pravdiza, Thomas.....
Pridham, Grenville.....
Pusey, William C..... 53
Rafferty, James A..... 35
Riffel, Bernhard..... 76
Salisbury, Robert H..... 60
Schaefer, Fred R..... 80
Schell, Edward R..... 18
Schell, Robert C..... 9
Schweiger, Edwin.....
Sherman, Oren G..... 20
Siebel, Emil A.....
Skooglund, David..... 20
Smith, Edward..... 10
Smith, Warren.....
Sommerfeld, Waldo..... 40
Stone, Porter E..... 27
Strauss, Walter C..... 72
Sullivan, William T..... 65
Summerhays, Elmer M..... 20
Sykes, Grover..... 9
Taylor, Percy J..... 10
Thompson, Roy S..... 10
Todd, Emory..... 68
Tolsted, Elmer..... 89
Wales, Henry S.....
Wallace, John D.....
Wheaton, Jesse R..... 35
Whitehead, Richard H. R.... 20
Wig, Rudolph J..... 63
Williams, Glenn R..... 40
Wolf, William J..... 15

Science and Arts.

Acton, Mary T.....
Adolph, Mabel H..... 28
Aldridge, Mabel..... 63
Amacker, Anna.....
Amberg, Robert A..... 15
Anderson, Agnes..... 20
Attley, Alice L.....
Babb, Belle..... 53
Backus, Burdette.....
Barber, Louise..... 12
Barker, Hazel P..... 19
Batdorf, John L.....
Beckerleg, Lillian E.....
Behl, Anna L..... 56

Bergman, Adele..... 18
Bergman, Ruth..... 68
Beverley, William N..... 15
Brickwood, Beatrice M..... 22
Brickwood, Genevieve M.... 67
Brown, Lillian.....
Bullard, Susan E.....
Burke, Alexander.....
Burr, Maurice.....
Callahan, May A.....
Carter, Ruth G..... 21
Carter, William A..... 41
Case, Emma L..... 33
Case, Winifred.....
Chapman, Edith B..... 27
Chapman, Edith M.....
Clark, Victor R.....
Collins, Nellie.....
Collins, Winifred..... 60
Cook, Jacob..... 35
Corkell, Paul P. C.....
Costello, Eunice..... 45
Cotton, Elizabeth S.....
Cunniff, May..... 35
Darsie, Marvin.....
Dashiell, Juliet.....
Davidson, Florence..... 64
Dean, Leola J.....
Decker, Rosalie..... 66
Denny, Mamie.....
Doremus, Paul H.....
Dowd, Grace E..... 30
Downey, Marguerite.....
Driscoll, Gladys.....
Dysart, Myrtle A.....
Eismann, Louise H..... 36
Eiszner, Bessie J..... 35
Evans, Josephine S.....
Falls, Frederick H..... 53
Fisk, Zoe E..... 73
Foote, Orra M..... 41
Franklin, Matilda R..... 38
Fraser, Marjorie..... 9
French, Henrietta.....
Gale, Minnie E.....
Garms, Lilia B..... 69
Gill, Nelle L..... 35
Hall, Mildred L..... 20
Haller, Sarah M.....
Hanna, Bessie J..... 44
Hawxhurst, Ralph R.....
Hayes, Daniel F.....
Hench, Horace B..... 15
Hedenberg, Cecelia.....
Hennecke, Grace L..... 36
Hinchliff, Alice.....
Hirsch, Selma K.....
Hoffman, Arthur C..... 62
Hoffman, Paul A..... 62
Holabird, Amy B.....
Holden, Grace.....
Hossack, Martha L..... 9
Howe, Marjorie..... 17
Hyland, Frances M.....
Ingram, Harold S.....
Jernberg, Prudence E..... 16
Jophes, Clara..... 68
Juhnke, Leo A.....
Kammerling, Walter W.....
Kelly, Cora..... 35
Kelly, Hazel D..... 36
Kendrick, Agnes..... 39
Kerner, Robert J..... 42
Kerr, Edith..... 20
Kilner, Mercedes..... 8
King, George R..... 15
Kinney, Francis E.....
Koepke, Frank O..... 36
Krock, Arthur B..... 35
Lacey, Maye.....
Lucas, Madelene D..... 71
Lukins, Gertrude.....A. B.
Martin, Amy M.....
Martin, Edwin..... 29
Mather, Arlisle E..... 75
Mather, Jennie..... 22
Mauritzen, Elsie E.....
May, Rexford L.....

McCallum, Edna N..... 71
McIntyre, Bessie F..... 22
McKinley, Martha B..... 30
McMahon, Agnes E..... 41
McMahon, Grace D..... 68
Melendy, Emma L..... 27
Miller, Alice E..... 22
Mix, Robert R..... 42
Moffat, Helen M.....
Mojonnier, Oliver W..... 8
Moorhouse, Amy..... 48
Morrison, Florence.....
Mulford, Helen..... 48
Munson, Frank W..... 35
Nicholson, John W..... 9
Norton, Florence F.....
Ohlendorf, Clarence..... 38
Patrick, Elizabeth L..... 36
Patton, Leigh..... 27
Pease, Theodore..... 63
Pierson, Myrtle C..... 16
Potter, Alice.....
Recktenwalt, Madeline M....
Richardson, Susanne E.....
Roeschlaub, Marguerite..... 48
Root, Helen M..... 18
Rosenblatt, Celia.....
Scholes, Ethel..... 33
Schrader, Marie C.....
Schreiber, Elizabeth..... 68
Sellards, John A.....
Serven, Edith.....
Silverberg, Annette..... 37
Simons, Harriet H.....
Skiles, Vera G.....A. B.
Smith, Anna E..... 25
Smith, Beatrice..... 10
Smith, Hobert.....
Smyth, Angela..... 20
Southwick, June..... 67
Spafford, Hazel C.....
Spence, Nellie G..... 38
Stephani, Frieda.....
Stickel, Joseph.....
Stout, Mary.....
Strawbridge, Mabel..... 15
Sullivan, Mary J..... 66
Swift, Florence R..... 24
Taylor, Martha G.....
Thompson, Clifford.....
Touzalin, Clara B..... 38
Towne, Elizabeth F..... 38
Walsh, Edna K.....
Wathier, Frances M.....
Wegeforth, Emma R.....
Wegner, Emily L.....
Wells, Cherrill..... 35
Wernicke, Harry..... 39
Wertz, Winifred W.....
Wilkens, Evelyn A.....
Winnard, Winifred M.....

High School Students.

Where no credits are entered, fewer than twelve have been obtained, or credentials for work done elsewhere have not been presented and recorded.

	High School Credits
Abbott, Arthur W.	36
Ackley, Floyd N.	64
Adams, Clyde L.	40
Adkins, George A.	68
Albee, Charles M.	39
Aldous, Wildred	28
Alexander, Lelia	61
Alexander, Walter	40
Allan, William S.	67
Andersen, Signa	34
Anderson, Arthur E.	22
Anderson, Siegfried	

Arguelles, Angelo S..... 24
Ashby, Raymond C..... 68
Ashby, Wilbert..... 78
Atkinson, Thomas C..... 16
Atwater, Harry A..... 68
Aufrecht, William..... 16
Aurand, Arthur G..... 52
Avery, Frank G..... 30
Bacon, Malcolm..... 42
Baggott, Russell L..... 16
Baker, Bernice..... 18
Baker, Ray C.....
Baldwin, Helen..... 38
Baldwin, Raymond..... 14
Balis, Grace K..... 82
Ballard, Achille T..... 31
Bangs, Adeline I..... 24
Bankes, Florence T..... 36
Bannister, Harold D. C..... 38
Baragawanth, Elsie..... 60
Baragwanath, Genevieve..... 31
Barber, Russell M..... 32
Barker, Roy T..... 41
Barr, Lawrence M..... 58
Barr, Marjorie..... 12
Barron, Marion..... 35
Bartik, Edward..... 52
Barton, Lucy A..... 14
Bassett, Cyrus W..... 70
Bates, Margaret..... 92
Bates, Sidney E.....
Bauerle, Robert..... 38
Bauerle, William W.....
Bauman, Wilbert M..... 26
Becker, Lotta E..... 12
Becker, William P.....
Beggs, Gertrude E..... 14
Beilfus, Matilda..... 42
Benedict, LeRoy G..... 12
Benson, Haskell.....
Benson, Mildred..... 34
Bergeron, Arthur H.....
Berndt, Erwin D..... 16
Bicknell, Scott..... 57
Bierfeld, Lillian..... 12
Biermann, Adela L.....
Binder, Byron O..... 12
Birkhoff, David..... 16
Birkhoff, John..... 69
Bishop, Arthur H..... 52
Bishop, Jessie E..... 98
Bishop, Mabel..... 76
Bishop, Robert F..... 32
Blatchford, John..... 82
Bloss, Eugene..... 73
Boesenberg, Edna L..... 12
Booth, Frank H..... 40
Bowes, Lawrence C..... 12
Brainard, Curtis.....
Brand, Paul..... 66
Bray, William J..... 59
Brenton, Robert R..... 14
Brill, John L.....
Bromberg, Johanna.....
Bromberg, Louis.....
Brophy, Frank..... 26
Brosseau, Joseph..... 83
Brough, William R..... 26
Brown, Edward J..... 20
Brown, Reuben R.....
Bruckner, Eugene..... 49
Bryan, Marie..... 60
Buck, Erma..... 30
Buettner, Lillie L..... 22
Burke, Henry..... 47
Burkitt, John W.....
Bushspies, Hazel M.....
Butler, Donald..... 24
Cain, Fred L..... 18
Campbell, David S.....
Campbell, David T. H..... 38
Campbell, Robert C.....
Canning, David W.....
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Women	123			
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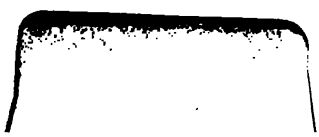
Boys	553			
Girls	209			
Special and Summer Students			248	
Students in Evening Classes				1162
Total				2390

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